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GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXV. No. 3167.] LONDON, JANUARY 23, 1924. [76TH YEAR. PRICE 1s.

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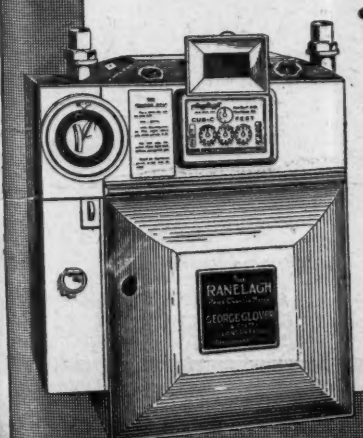

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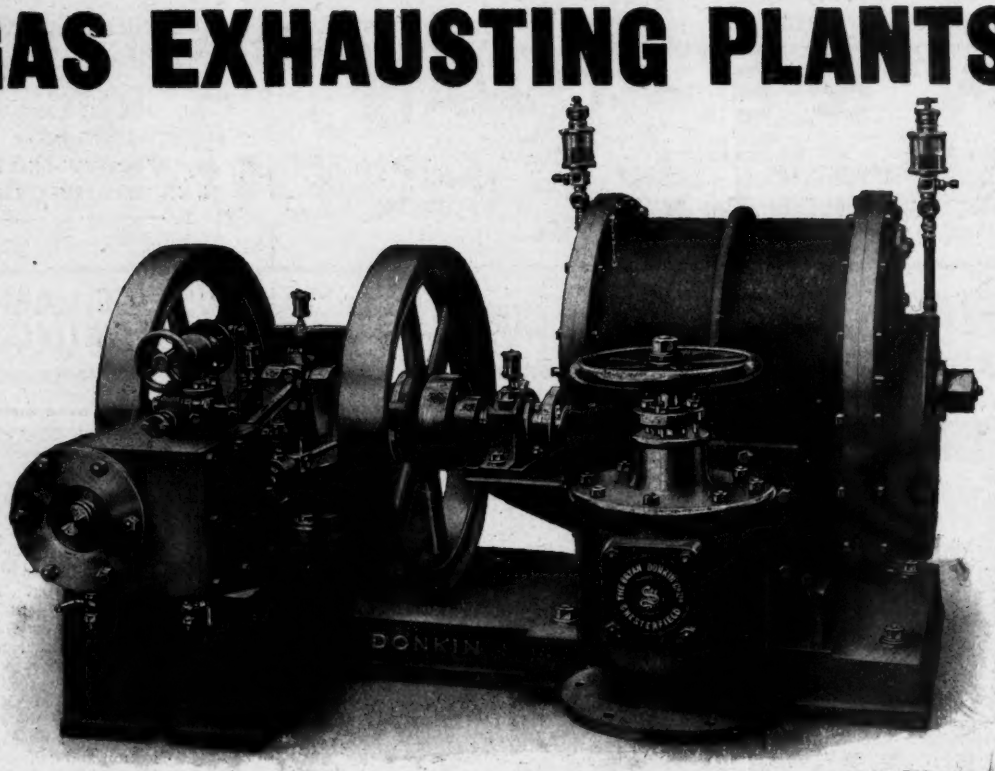

Fig. 792.

Gas Exhauster coupled direct to Horizontal Steam Engine (C Type) combined on the same cast-iron baseplate.

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EDITORIAL NOTES.

Railway Companies and the Gas Industry.

ONE particularly noticeable feature in connection with the gas industry during the past few years has been the development by the railway companies of the policy of intrusion into its affairs and interests. But in calling particular attention to the matter now, we should like to make it clear to the railway companies that we do so not in any antagonistic spirit, but with the view of submitting to them that the policy has become somewhat autocratic, and that it is time they should reconsider it, and see whether a modified attitude would not be more appropriate and conducive to good and friendly relations between two such important public services. We acknowledge freely that the railway companies are good customers of gas undertakings; but the fact does not give warrant to any special privilege to intrude into the affairs of the industry, with the view on every occasion of making the conditions of working more onerous. That would have been the effect if certain of the proposals of the railway companies had materialized during the past decade or so. It should not be forgotten that, while the railway companies are good customers of the gas industry, gas undertakings are daily good customers of the railway companies. The tonnage of traffic over the railways due to the requirements of the industry is immense; and its regularity will bear comparison with that of any other industry. Nevertheless, it has not been the practice of the gas undertakings to interfere legislatively with the schemes of the railway companies; all they have done, and that very properly, is to obtain the best possible terms for the conveyance of their materials and goods. And that is only commonsense business.

But the railway companies have expanded remarkably in arrogating to themselves the right to meddle, in Parliament and before the Board of Trade, with the affairs of the gas industry. How little they have been justified in some respects has been shown by the results of departmental investigation. There were the subjects of inerts, the question of gas pressure in relation to calorific power, and now there is the obstruction to the protective power that gas undertakings in these times seek in respect of the old obligation to supply on demand, whether or not the capacity of mains is adequate to the new supply without jeopardizing the sufficiency of existing supplies. Naturally, gas undertakings would remedy as early as conveniently possible any such deficiency; they are not likely to do anything to drive away new business, or to reject it for even a day longer than is necessary. The conditions of gas demand, however, are now altogether different from those that existed when the Gas-Works Clauses Act of 1871 was passed. The lighting demand was the principal—practically the only—one. Now the requirements even for household purposes are considerably different; and the loads on the mains have very large variations, seasonally and even hourly. This is also the case with the industrial demand. Often, for example, new factories are built at the extremities of a gas-distribution system; and the demand in such circumstances might necessitate an extensive and very costly amount of main-laying, which cannot be done in a day. These changes in conditions should be taken into account when considering modification of, or protection against, legislation framed and passed in other days and circumstances.

There are other ways in which the railway companies have been exercising themselves in applying more stringent conditions. The protective clauses which they insist shall be inserted in Gas Bills have become far more exacting than they were a time ago. And when once they have succeeded in creating a precedent in the Act of a gas undertaking, they use it as a model for all succeeding Gas Bills in which they are concerned. These protective clauses, having vastly changed during the last two decades, are tending more and more to impose heavier burdens upon gas undertakings. There is yet another way in which railway legislation may operate to the detriment of gas undertakings, and this is in respect of clauses in the Bills promoted by the railway companies themselves. The National Gas Council have not missed notice of these matters; and they are certainly worthy of investigation. The position is such that undertakings must consider whether they should not seek protection against the railway companies, who have given them ample example in this regard. The spirit, of course, should be mutual accommodation with the minimum of irksome condition, consistent with justice; otherwise the position must be prejudicial—as things are, more to gas undertakings than to the railway companies. One-sided protection is not fair. There are, for instance, the powers sought as to level crossings over existing roads, in which case the railway companies desire that gas-mains under the crossings should be laid in the manner that they approve. Protection may be necessary in such circumstances, and against injury to the mains by the railway. The construction or widening of bridges over roads in which gas-mains are laid may also be the subject of protection. Then where a railway company obtain power to construct a line across a road and to carry the road over a bridge, there is the proper gas-main accommodation to be provided for, and auxiliary conditions to be considered which we will not specify here. The stopping-up and diversion of roadways by railway companies may also necessitate gas-main alterations, the costs of which should be borne by the railways and not by the owning gas undertakings. Losses are sometimes incurred by gas undertakings in connection with the acquisition and demolition of buildings by railway companies. Here, again, there is good ground for compensation in respect of capital expenditure rendered useless.

Around questions such as these and others, there is abundant reason for seeking protection in conformity with modern conditions. The Railway Clauses Consolidation Act, 1845, confers certain rights on gas undertakings in relation to railway works; but the enactments are antiquated, and not in keeping with modern circumstances. Revision is required. We are afraid that in some respects gas undertakings have been too easy-going in relation to the requirements of the railway companies and the conditions they have sought to impose. While one can be reasonably tolerant, one need not be too submissive. Also it is a duty to see by critical examination that the railway companies' own plans and schemes do not detrimentally affect the interests of gas undertakings.

Gas Workers' Wages—Revision of Sliding-Scale Agreement.

IT has been general knowledge in the gas industry that, at the instance of the workmen's representatives on the National Joint Industrial Council, the terms of the sliding-scale agreement have been under consideration by a Joint Sub-Committee. Various meetings have been held at which there were full discussions. The nature of these and of the arguments that were advanced and caused determination,

is not known; but that they were convincing is indicated by the fact that the recommendation made by the Joint Sub-Committee as to the amending of the sliding-scale agreement was a unanimous one, as was the decision of the Joint Industrial Council that the proposed amendments should be approved and adopted.

It may be briefly stated that the result of the amendments is to increase the wages of male gas workers of eighteen years of age and over by ½d. per hour as from the 1st inst. If and when the average cost-of-living figures for a period of three months, as determined in accordance with the provisions of the principal agreement, rise to 79, the wages of these workers are to be increased by a further ½d. per hour. Should the average cost-of-living figures for a period of three months rise to 80, the employees' side, it has been agreed, will be justified in making an application, upon giving one month's notice in writing, to discuss a further increase in wages. There is also a provision that no reduction of wages is to take place from the average cost-of-living figure of 79 downwards until the average figure of 65 is reached, when wages are to be reduced by ½d. per hour. If the average living figure reaches 60, the employers' side, it has been agreed, will be justified in making a request, upon giving one month's notice in writing, to discuss a further decrease in wages. The increases in the agreement carry the 12½ p.ct. bonus in those cases in which undertakings have deducted it in the recent reductions under the sliding-scale agreement.

In connection with this amendment of the wages sliding-scale for gas workers, it is interesting to note that little or no change occurred in the cost of living in December. At Jan. 1, the average level of retail prices of the commodities taken into account in the statistics prepared by the Ministry of Labour (including food, rent, clothing, fuel, light, and miscellaneous items) was approximately 77 p.ct. above that of July, 1914, as compared with 77 p.ct. a month earlier, and 78 p.ct. a year ago. For food alone the corresponding percentage for Jan. 1 was 75, as compared with 76 a month ago, and 75 a year ago. But this decrease was considerably counterbalanced, in the general average for all items of expenditure, by increases in the price of coal and cotton goods.

The Chemical Manufacturers and the Gas Light and Coke Company.

THE attack of the Chemical Manufacturers on the liberties and economical working of the gas industry has broken out in a fresh place. It was not this time in the Parliamentary Committee Rooms, but in the Chancery Division of the High Court of Justice, and before Mr. Justice Astbury. The plaintiff in the case was Mr. J. Lindsay Deuchar, who is the Secretary of the Castner Kellner Alkali Company; and the defendants were the Gas Light and Coke Company. The action is one of great importance for gas undertakings. If it had succeeded, or should it succeed if carried further, it would have important effects upon gas undertakings, both present and future—particularly the future. It is patent that the case may be taken as a test one by the chemical manufacturers; and the submission is that gas companies are not entitled to manufacture substances which they require for the purpose of treating their secondary products. If such a contention were upheld, it would have an important economic effect upon the gas industry. It would mean that, no matter how dear the chemical manufacturers liked to make the price of a commodity needed for the working-up of a secondary product, and no matter how cheaply a gas undertaking could produce for themselves what they required, they would—to the detriment of their concern, their primary product, and the public—have to satisfy their requirements by purchasing at the price asked by the chemical manufacturers. Of course, such a position is unreasonable.

In this case, the plaintiff sought to have it declared that the manufacture of any chemicals or substances required for the working-up of the Company's secondary products, and the erection of any building, or the utilization of the Company's funds, for the purpose, were *ultra vires;* and an injunction was asked for to restrain the Company from doing these things. That was a sweeping request which, it does not require much imagination to see, would, if successful, mean serious limitations. The actual secondary product concerned in the case was naphthalene; and the substance which the Company are making, and to which the plaintiff objected, is caustic soda, which is required to convert the naphthalene into beta-naphthol. For many years the Company have been purchasing caustic soda for the purpose; but, owing to the high price, they provided plant (of sufficient capacity for their own needs) for its manufacture by the catalytic process. It transpired that the Company can make the caustic soda at less than one-third of the price they have to pay in the market. This is a considerable economy; and not to realize it, we consider, would be a dereliction of duty on the part of the Company in respect of the conduct of the primary business of supplying the public with gas at the lowest possible price. That is the whole point; but as we have already remarked, it is an important and far-reaching one.

The upshot was that the plaintiff lost his case; his Lordship, as will be seen from the report of the proceedings in our "Legal Intelligence" to-day, holding that what the Company were doing in respect of the production of caustic soda is within their statutory powers. Towards the end of his judgment, there were some significant passages. The true test, his Lordship said, was whether the thing objected to was reasonable to assist in carrying out one of the statutory objects of the Company. There was nothing in the Statutes which in any way indicated the method by which they were to obtain the article necessary for conversion; and, in the absence of any necessary provision, he could not understand why it was any worse for the Company to make caustic soda than to buy it in the market. If they could make it cheaper and more efficiently, they were, in his opinion, entitled to do so. Defendants were in no sense setting up as caustic soda manufacturers or chemical manufacturers. If they were *bonâ fide* carrying out one of their statutory objects, the method of doing so was immaterial unless it was circumscribed by the statutory constitution. So this fresh move very properly has failed. Whether more will be heard of it, we have no present knowledge.

The Railway Strike.

THE country has of late been faced with some uncomfortable problems regarding labour, which have proved very expensive industrially and nationally. There are always problems connected with labour; but regarding them there has been much searching to find ways and means to avert the crude form of gaining ends by means of strikes, with their ugly accompaniments of privation and waste. Conciliation machinery has been devised. In the case of the railway men, dispute-settling machinery of a complete order was devised, and agreed to, some time ago. The machinery has hitherto worked fairly smoothly; but now that one of the most critical matters upon which it has had to operate has been dealt with from beginning to end, one of the parties has repudiated its decisions. This is not constitutional, and it is not cricket. It shows a curious sort of mentality—men agreeing to submit disputed issues to a tribunal in the creation of which they have taken part and on which they are represented, and then, if the decision does not square with their desires, refusing to accept it, and falling back upon the old-fashioned method of striking in order to produce (that at any rate is the object) sufficient disorder to bring about compliance. But strikes are not so effective now as they were formerly. However, a strike has been threatened the last week or two (and is now in full swing) by the Associated Society of Locomotive Engineers and Firemen, and that on a ballot vote the figures of which, we think, showed a substantial difference of opinion among the members, inasmuch as the actual voting results were kept secret. On the other hand, the National Union of Railwaymen and the Railway Clerks' Association loyally accepted the verdict of the National Wages Board; and the Railway Companies themselves had no alternative but to be also loyal to the results of the investigations and deliberations of that body. For the companies to have broken away from them, through pressure from a section of malcontents, would have been a grave error on their part—an action which would have undermined conciliation, so far as the companies are concerned, for ever.

Throughout last week efforts were being made, more or less subterraneously—at times it seemed almost meticulously—to avert the strike, through both the Council of the Trade Union Congress and privately, though, with the National Union of Railwaymen loyal to the agreement to which their leader (Mr. J. H. Thomas, M.P.) had appended his signature, it was clear that the menaced stoppage could not be a complete one, notwithstanding that the aggrieved Union embrace a large proportion of the men who are the

"key" ones in the operation of a railway system. The official timing for the strike was Sunday midnight; and the endeavours to do something to prevent it were continued up to the critical time. But this was not the only direction in which there was great activity during the week. The threat made people anxious as to the conveyance and delivery of materials and goods. Among these were the managers of gas undertakings; and from various sources we hear of heavy pressure being brought to bear upon colliery owners and coal factors to hasten up deliveries. But the trouble was that the desires of the gas industry were only representative of those of most other industries and of the coal-retailing merchants; and we are afraid that Saturday arrived with many unfulfilled expectations and great disappointments. However, throughout Saturday, news was eagerly awaited as to whether or not the normal means of conveyance and communication throughout the country were to be severely curtailed. But it was not until practically midnight on Sunday that it was known that the worst that had been anticipated was to be fulfilled, and that a stoppage was inevitable—everything that reasonably could be done to prevent it having failed. The course the Society have taken is in direct opposition to the advice of the other prominent labour leaders, and in opposition to the views of the other two Railway Unions.

So we started a new working week with nearly 60,000 enginemen and firemen refusing to perform their duties; and the unfortunate thing is that some members of the National Union of Railwaymen (so it is reputed) are not acting loyally to their Union or honouring the agreement that was effected in their name. They are out, so it is said, in "sympathy" with the strikers. It is a pity that they had not a larger measure of sympathy for the public and the country, which is already in a sufficiently uncertain state, as well as a deeper sense of what is due from them to their Union and their leaders. There is, as we write, an almost complete dislocation of railway traffic throughout the country; and, unless there is a speedy resumption of work, it must be that certain of our industries will become wholly paralyzed through the inability to obtain materials and to dispatch goods. There is no body of men whom we admire more than the enginemen and firemen on our railway systems. On them a great responsibility rests; and normally they discharge their duties with exemplary conscientiousness. But the public are not likely to forget the circumstances in which this strike has taken place. Not only have the matters in dispute been adjudicated upon by a competent tribunal, but the stoppage is occurring at a time when there is much industrial inactivity—when, in consequence, there is much unemployment, and therefore much poverty, which is not the case with railway enginemen and firemen. The effect of the strike will be considerably to worsen these conditions.

The Miners' Wages Agreement.

THE machinery for the settlement of disputes, referred to in the preceding article, is one way of trying to avoid ruptures between employed and employers in the industrial world. Another method is by giving labour an interest over and above wages in the proceeds of an industry. This plan has been tried with success in several industries—in, for example, the gas industry. It has been essayed in the coal-mining industry, but under conditions, for which the miners themselves are principally responsible, which have been unfair to the system, and have placed it under difficulties in realizing success—that is, the refusal to lengthen the hours of work from seven per day, and so increase production and reduce costs. Partially traceable to this is the reason for the discontent there has been in some coal areas with the working of the national wages agreement, which was entered into after the three months' coal strike, and which at the time it was thought was going to be an effective instrument in producing more composed conditions in the industry. The agreement in effect regulated not only wages, but profits, and made provision for the division of surplus profits. Some districts have not received any advantage from surplus-profit sharing owing to the cost of production, in which the seven-hour day is an important factor. The agreement has never had a fair chance in most of the areas. Nevertheless, the miners for the past year or more have been asking for a higher standard wage and a larger percentage of the surplus profits. Regarding the latter, the representatives of the colliery owners were willing to recommend some concession; but as to the former they were not, in view of the fact that it would mean an addition to price for the consumer, and coal prices in all conscience are, even now, markedly protuberant compared with those ruling ten years ago.

However, we will give the leaders in the Miners' Federation credit for acting precisely on the lines of the agreement, although ultraists among them have been favourable to taking more drastic steps in the attempt to realize their objective of a greater share for the miners. But there are, besides personal views, substantial conditions of a financial order within the federated miners' unions which call for moderation. But the extremists obtained their way in one respect, and that was—in pursuing the legitimate routine of taking a ballot of the men to ascertain if the prescribed three months' notice should be given to terminate the national wages agreement—to advise the men on the ballot papers to vote in favour of termination. This advice alone vitiates the value of the ballot. It may be taken that a large number of the men, out of loyalty to the Federation, through that advice cast their votes in the way suggested, with the result that 510,303 voted in favour of termination, and 114,558 against. The overwhelming majority creates a considerable amount of uncertainty as to what is likely to happen; but there is no immediate danger. From last Friday—the day on which the notice was formally given to terminate the agreement—there are three months within which to seek for acceptable conditions. The notice will expire on April 17. Failing discovery of acceptable conditions, or effective parliamentary action, then the strike issue will come up in definite form. Another ballot will be necessary, and a clear two-thirds majority must be procured before a stoppage can take place. But the immediate course of events is of interest. The owners cannot do anything until the Mining Association have consulted the District Associations, which will be done as speedily as possible. On the other hand, some of the miners' leaders are anxious to get to work quickly. At this we are not surprised, as the leaders must recognize that the heavy vote they have secured in favour of terminating the agreement will only inflate the notions of the miners as to the concessions they should obtain, and so will make negotiation all the harder, and the result still more problematical. All that can be done is to watch events; but in the calculations of gas managers as to the future, prudence will direct, and a safety-first policy will have weight. This, however, is fairly certain: Should there be failure in arriving at a new agreement satisfactory to all parties, a strike in the early summer could not possibly be of long duration, owing to the prevailing internal conditions of the trade unions. They have suffered heavy losses of members, and consequently subscriptions; and solid funds have been dissipated through strikes and lock-outs. It is well known that in the mining industry the unions have not recovered their financial equilibrium since the abortive three months' adventure upon which they entered with so much boldness, but emerged considerably chastened and impoverished.

In an earlier part of this article, allusion is made to the fact that, if the miners would only extend their working period of seven hours a day, more coal could be produced, the price to the consumers could be lowered, and the proceeds of the industry and consequently wages could be higher. A recently issued statement compares the output of 1923 under the seven-hour day with that of 1913 when eight hours were worked underground. For the purpose of comparison, the counties of Northumberland and Durham, where the hours of underground working were unchanged by the Act of 1919, are excluded. Omitting these two counties: In 1913, 884,000 persons, working eight hours a day, produced 231,059,000 tons of coal, or 261·3 tons per person employed. In 1923, 928,500 persons, working seven hours a day, produced 224,787,600 tons, or 242 tons per person employed. It will, therefore, be seen that, although the average number of persons employed has increased by nearly 45,000, the number of tons produced has fallen by over 6 millions, and the production per person employed by nearly 20 tons—representing over three weeks' work. Had the hours worked underground and the production per person employed been the same in 1923 as they were in 1913, an additional 17,829,450 tons would have been raised, with extremely beneficial results both to the public and to the miners themselves. In this we have one important reason for the failure to produce more surplus profits which would have been divided—83 p.ct. going to the miners.

Gas Coke Sales Abroad.

A NOTABLE feature of last year's trading is the considerable continued increase of the demand for coke of all sorts for the Continent. This is partly due to the cessation of supplies from the Ruhr; but there is no doubt that other causes are also operating. In 1921, the shipments of gas coke amounted to 443,565 tons; but in 1922, the purchases more than doubled—the quantity being 911,307 tons, or an increase of 467,742 tons. But while this rate of increase was not maintained in 1923, the total quantity exported was 1,224,302 tons, or 312,995 tons more than in 1922, and 780,737 tons more than in 1921. The best price per ton in the three years was obtained in 1921. The value of the 443,565 tons then shipped was £918,081, or an average of £2 1s. 4·7d. per ton. There was a considerable drop in the average per ton in 1922. The value of the 911,307 tons was returned as £1,287,079, or an average of £1 8s. 2·9d., which was 13s. 1·8d. per ton less than for 1921. But there was a partial recovery last year. The 1,224,302 tons then shipped had a value of £1,990,532, which averaged £1 12s. 6·2d. per ton, or 4s. 3·3d. per ton more than in 1922, but 8s. 10·5d. below the average value for 1921.

The effect of this business upon the coke market at home has been, from the financial point of view, very beneficial to gas undertakings. But at the moment it is difficult to say how long it will continue at the present level; this will largely depend upon the easing of the European situation. The German gas-works have had very little coke to spare since coal supplies from the Ruhr were discontinued; but when later on they are able to satisfy their home requirements, and come into the export market again, it will be a question of competition between them and British gas-works for a large part of this business. But there is little reason why we should not hold it for a considerable period ahead, although the time may come when the availability of coal in Germany and the cost of coal here will have a substantial modifying effect upon the relative positions in respect of coke competition. At the present time, Germany is a large buyer of coal from this country; and had the gas-works the coke to spare, the fact that they have, to such a large extent, to import the coal they use, would not contribute to their strength in the matter of coke competition. The policy of gas-works at home should be to do all they can to utilize this opportunity for establishing themselves firmly in the gas coke business abroad, and to keep themselves well supplied with intelligence as to the development of influences abroad which may affect the overseas market in future. Some co-operative means for obtaining this information might perhaps be adopted.

Coke classified as "other sorts," which means mostly metallurgical coke, has had its demand intensified by like causes, though for different uses. The flight in demand is rather eloquent of the activity of the metallurgical industries on the Continent. Last year, no less than 2,745,905 tons were exported, compared with 1,602,671 tons in 1922, and only 292,648 tons in 1921. The values were: 1923, £6,383,140; 1922, £2,352,971; and 1921, £700,630. It is this big increase in export that has brought a large number of the coke-ovens again into commission. Had they to rely only upon the home demand for metallurgical coke, their return to active service would have been far more gradual.

The Balance for the Consumers.

There is an interesting clause in the Chesterfield Corporation Act (noticed in a later column) which provides for the consumers having, through reduced prices, any excess profits there may be over £2000 after all the ordinary charges have been defrayed, as set forth in the section. Provision, however, is made for the excess above £2000 being retained by the Department should an estimate show the probability of the revenue for the next succeeding year being insufficient to meet the stated obligations. We are glad to see the adoption of any scheme by municipal corporations which ensures that those who support a public service have the advantage of any surplus profits. This is the right course. The handing-over of profits to the relief of the rates is not, because such distribution constitutes a super-tax upon the patrons of the public service. When, however, consumers of gas have surplus profits divided among them by way of reductions of price, of course the obligation should be upon them of making-up, through an increase of charge, any deficiency that may arise.

Coal Exports for 1923.

The coal industry has ended a year of export coal business with which they have cause, having regard to the conditions at home, to be truly thankful. The shipments of coal of all kinds in December amounted to 5,873,965 tons, of which gas coal figures for 622,707 tons, which was rather less than for the corresponding month of 1922 and 1921. The value of the gas coal was £761,781, or £1 4s. 5·6d. per ton. The total quantity of coal exported during the year was 79,449,678 tons; the value being £99,835,646, or £1 5s. 1d. per ton. In 1922, the amount shipped was 64,198,384 tons; the value being £72,529,500, or £1 2s. 8d. per ton. In 1921, 24,660,552 tons were exported, having a value of £42,951,591. The average value in 1913 was 13s. 8d. The gas coal exported last year was 9,102,450 tons; the value being £11,058,880. In 1922, the amount shipped was 9,197,544 tons; and in 1921, 3,740,744 tons.

Gas Coke Shipments.

In December, 109,417 tons of gas coke were exported, of a value of £189,028. In the corresponding month of 1922, the figures were respectively 94,985 tons and £133,070; and in 1921, 52,376 tons and £84,898. The returns for the year are dealt with in an article in our editorial columns.

Sulphate of Ammonia.

With a shipment of 22,689 tons in December, the total quantity of sulphate of ammonia exported last year was 253,287 tons. With a shipment of 17,954 tons in December, 1922, the total amount exported that year was 144,317 tons. Thus last year saw an increase of business abroad to the amount of 108,970 tons. Spain, the Canaries, Japan, and the Dutch East Indies, were among the best buyers during the year; Japan particularly is noticeable—having taken 60,117 tons, as compared with only 1255 tons in 1922.

Smoke and Health.

The statements made by Mr. David Brownlie in a communication to "The Times" regarding noxious emanations from gas-fires were referred to in our issue last week. So far he has not favoured us with the information which we asked that he should forward in proof of his assertions, and to serve as a basis for discussion. The British Commercial Gas Association (through their Secretary, Mr. J. C. Walker) wrote to "The Times" requesting Mr. Brownlie to refer them to any satisfactory evidence of modern gas-fires producing any noxious products whatever in quantities that could be measured. We hope Mr. Brownlie will reply, as it will be of particular interest to test the strength of the foundation upon which his "opinion" was based. Before his letter appeared, Dr. J. S. Owens had made a most interesting communication on London sunshine records, which showed a considerable percentage improvement as compared with rural stations—an improvement gradually made during the past forty years. He bears witness to the greater purity of the air of London being traceable to the increased use of smokeless heating and cooking devices and improved appliances, as well as methods of combustion in the case of industrial furnaces. We are rather more inclined to accept Dr. Owens' view than Mr. Brownlie's "opinion" where a question of air purity is concerned. While mentioning this matter, it is rather interesting to have attention called by another correspondent to the fact that the Government from their buildings in Westminster and the London County Council from the new County Hall are contributors to the pollution of the atmosphere in London. Yet Governments introduce Smoke Abatement Bills, and the London County Council make and adopt long reports on the subject of lessening the evil. They surely ought to be models in this respect to their constituents.

British Empire Exhibition.

The British Empire Exhibition at Wembley will be one of the most marvellous pieces of enterprise in which this country has ever engaged in this line. Great advances are being made to-day in the structural and equipment work, which is to demonstrate the industrial resources of the Empire. There will be a wonderful variety of interest and instruction in it all; and the spectacular displays which will accompany it will, it is evident, be of unrivalled magnitude and splendour. No one will miss

Wembley who can possibly get there. It is all going to be highly magnetic. The Palaces of Engineering and Industry, in which we are chiefly concerned, are complete from the structural point of view; and now armies of men are engaged upon the work of equipping them. The heavy machinery will take some time to instal; but the lighter displays—such as the gas and electrical exhibits—will be more easily handled. Huge cases are now arriving daily from overseas; and a large amount of gas-heated apparatus is being received by Messrs. Lyons for catering purposes. The shaft to the coal mine which the Coal Owners' Association are exhibiting has been sunk; and all is in readiness for the erection of the head gear and winding machinery. It is announced that arrangements have been made with the railway companies to carry exhibits at half rates at owners' risk.

No Awards, but Commemorative Medals.

In our opinion, the Board of the Exhibition have come to a wise decision on the question of awards. Many representative exhibitors pressed strongly that awards, on the competitive system usually adopted at exhibitions, should not be made; and it was felt that the unavoidable difficulties experienced at past exhibitions in assessing effectively the different exhibits under this system, would be enormously increased at the Wembley Exhibition, where the only competition would be among exhibits of the various parts of the Empire. The Overseas Governments expressed themselves unanimously in favour of abandoning competition; while in the case of the United Kingdom Sections, an overwhelming majority of exhibitors was against the competitive system. The Board of the Exhibition have, therefore, amended the regulations of the exhibition; and a Commemorative Medal, accompanied by a decorative certificate, will be awarded to each exhibitor who has rented space in the United Kingdom Section. India, the Dominions, the Colonies, Protectorates and Mandated Territories will receive for distribution among their exhibitors a sufficient supply of identical medals and certificates. Exhibitors participating in collective exhibits of products or manufactures organized by the United Kingdom or Overseas Governments, or in Art and Scientific Research exhibits organized by Governments, Associations, and Committees, will receive a Diploma of Honour.

Trade Union Losses.

No secret has been made by some of the leaders in the trade union movement as to the serious losses the organizations have sustained during the past few years. The trade unions reached the zenith of popularity among the workers during the years when they could in large measure dictate their own terms. But there came strikes which were unsuccessful, and a strong ebb in industrial activity. The day of the autocratic power of the unions had passed; and there were heavy secessions from their ranks, combined with withdrawals through unemployment. Exact figures are now available as to the losses suffered in 1922. The unions lost nearly a million members that year; their ordinary income diminished by £2,445,000; and at the end of the year funds had shrunk by upwards of £1,000,000. This shrinkage had been going on consistently during both 1921 and 1922. At the end of 1922, the members numbered 4,559,167, compared with 5,506,490 twelve months earlier, and 6,981,750 at the end of 1920. Thus the decline in membership in the two years was no less than 2,422,583. It is stated that the coal stoppage in 1921 imposed a charge on the Miners' Unions of nearly £2,000,000.

Institution of Public Lighting Engineers and Superintendents.

Arrangements have now been made for the inaugural meeting of the Institution; the date and time fixed being 2 p.m. on Friday, Feb. 15, in the Board Room of the Holborn Borough Council, No. 197, High Holborn, London, W.C. The chair will be taken by Mr. S. B. Langlands, Lighting Superintendent of the City of Glasgow (President of the Institution). Mr. Crane Cooper, of Wakefield, having relinquished the office of Secretary, owing to pressure of business, Mr. W. J. Liberty, Public Lighting Inspector, City of London, Guildhall, E.C., has accepted the position of Hon. Secretary and Treasurer until such time as the Institution has become established. To him all applications for membership, &c., should be addressed. The full programme of the meeting, and all other particulars, will be ready for issue in a few days, and will be forwarded to applicants.

PERSONAL.

Last Thursday the Burnley Gas Committee selected to succeed Mr. J. P. Leather as Gas Engineer and Manager, Mr. J. H. CLEGG, who is at present the Deputy Engineer. Previous to coming to Burnley in 1918, Mr. Clegg was Second Assistant at Blackburn; and had been at the Earby, the Nelson, and the Aldershot Gas-Works. He is President of the Manchester and District Junior Gas Association.

A list of recently elected members of the Society of Chemical Industry includes the name of Mr. FRANK P. TARRATT, Chief Engineer of the Newcastle and Gateshead Gas Company.

At the offices of the East Hull Gas Company last Friday, Mr. JOHN PIPES, Outside Superintendent, was the recipient of handsome presents from the Directors and his fellow employees, on the completion of forty years' service with the Company. The gifts consisted of a suitably inscribed gold watch and a cheque from the Directors, a smoking cabinet from the workmen, and a silver fruit dish to Mr. Pipes' daughter from the employees. Mr. B. G. Jalland (Chairman of the Company) presided, and was supported by his co-Directors Mr. F. J. Gardham and Mr. C. N. Jackson, and Mr. R. Nelson (General Manager). In presenting the cheques and gold watch, the Chairman said his own association with the Company extended over forty years, and during that time there had always been excellent feeling among the employees, the staff, and the Directors. Mr. Gardham associated himself with the remarks of the Chairman. In response, Mr. Pipes said he had worked under five managers.

OBITUARY.

By the death last Sunday week of Dr. THOMAS WILLIAM THURSFIELD, Leamington has lost one of its most prominent townsmen, and the Leamington Priors Gas Company a highly respected Chairman. Deceased, who was 84 years of age, was an Alderman, and had been Mayor of Leamington from 1894 to 1897. He had been Chairman of the Gas Company for many years, and his addresses to the shareholders always exhibited a thorough grasp of all matters relative to the industry.

Co-partnership has lost a staunch supporter by the death last Sunday, at Hindhead, of Mr. ANEURIN WILLIAMS, after three months' illness. Deceased, who was 64 years of age, received his call to the Bar at the Inner Temple in 1884, and was at one time a Liberal Member of Parliament. He was also a Director of the First Garden City, Ltd., and Joint Hon. Secretary of the Labour Co-Partnership Association. Various publications on the subject of co-partnership were from his pen.

Dawlish has lost a useful public man by the death of Mr. JAMES GAMLIN, who, in addition to being a member of several governing bodies of the town, was a Director of Dawlish Gas and Coke Company.

The late Alderman ALEXANDER BOYD, of Belfast, was one of the most active members of the Gas Committee, and took the keenest interest in the administration and welfare of the departments under their control.

EVENING STAR LODGE, NO. 1719.

The W.M., W.Bro. Frank West, and Mrs. West welcomed the guests attending the Ladies' Festival of the Evening Star Lodge, which was held on Tuesday, the 15th inst., in the Edward VII. Rooms of the Hotel Victoria. A company of about 200 ladies and gentlemen were present, and a very enjoyable evening was spent. The Worshipful Master presided at the dinner, supported by a number of Past-Masters, including W.Bro. William A. Surridge, P.A.G.D.C., W.Bro. Fred J. West, C.B.E., P.P.G.D., East Lancs., W.Bro. H. W. Packham, P.P.G.D., Surrey, W.Bro. Arthur Valon, L.R., W.Bro. Cyril Davis, L.R. (Treasurer), and W.Bro. Walter T. Dunn (Secretary); and by the Wardens Bros. Rae P. Normand and H. L. Sheppard, and the Deacons Bros. Alfred H. Henry and Frederick G. Cockey. Orchestral selections were played during the reception and dinner, and the subsequent toasts were interspersed with a very acceptable programme.

After the Loyal Toast had been duly honoured, that of "The Ladies" was cordially pledged at the call of W.Bro. Valon, and was happily acknowledged by Mrs. Fred West. "The Visitors" was in the capable hands of W.Bro. Fred West, in consequence of the absence of W.Bro. Jacques Abady, P.M., L.R.—a circumstance much regretted. W.Bro. W. McDowell adequately responded on behalf of the visitors. The toast of "The Worshipful Master," proposed by W.Bro. Davis, elicited an interesting reply by the Chairman, who afterwards called upon Bro. G. D. Bidwell to come forward to receive the Cyril Davis silver challenge cup of the Evening Star Golfing Society, which had been won by him in the competition last November. The recipient, in expressing thanks, referred in appreciative terms to the excellent arrangements made for all the players by the Hon. Secretary of the Society, W.Bro. Packham.

Another pleasing incident of the evening was the gift to each lady present of a souvenir of the occasion, which took the form of a delicately wrought and mounted piece of Sheffield cutlery.

ELECTRICITY SUPPLY MEMORANDA.

ELECTRICITY supply appears to be going through the mill just lately in respect of troubles which do not raise the confidence of the public in it. We do not gloat over these, but simply record the facts as being opposed to the wonderful character of safety and reliability with which our electrical competitors attempt to invest their commodity. Several failures of supply have been recorded recently; and people who rely solely upon it have been put to considerable inconvenience—particularly tradesmen. Acton had the experience on the evening of last Saturday week—the one evening in the week when the shopkeepers could have prayed most earnestly to be delivered from such a happening. The trouble lasted from about six to eight o'clock; and candles came to the assistance of the newer illuminant. It can with a fair amount of certainty be said that electric lighting will, through its liability to failure, assist to keep the primitive candle in existence as a necessary. Through the frequent failures of the supply at Reigate, a petition has been numerously signed by the traders, and sent to the Town Council. It recites how the signatories view with the gravest concern the constant failing of the electric light—plunging their shops into darkness often at the busiest hour of the day, when crowded with customers. They point to the loss of trade and constant risk of fire through the compulsory use of candles and oil-lamps. A very strong appeal was made to the Council to do everything possible to prevent a recurrence of the trouble; but even in the best of regulated electricity systems, there are those mishaps. Take Bradford, for example. There was an explosion on a recent afternoon at the station, injury was done to the plant, and the electric lights in certain parts of the city were extinguished for about half an hour. This occurred in the gloaming; and it is reported that there was much confusion in the mills where electric light is used. We have read lately of the stoppage of trains on tube railways and the cars on tramways; and there was the recent destruction of the Clacton-on-Sea power station. Last Wednesday evening, the electric light in several parts of Paris failed. The Grands Boulevards were affected, as well as the districts of the Bourse, the Opera, and Montmartre. An account is published of a violent explosion of a steam turbine at the Shanghai electricity works, which resulted in the death of three British engineers and grave injury to a fourth. An unkind reporter attributes the destruction of the church of St. Augustine, Hornsey, to electricity, which was used not only for lighting, but for blowing the organ. Then further lives have been lost due to electrical causes. The daily newspaper man may not always be able to claim absolute veracity, but we must not say that of the "Electrical Review." It reports that a Greenock caulker was working at the bottom of a dock, when he took hold of a cluster of electric lamps by the reflector, in order to move it into position; he was instantaneously killed. In another part of the same issue, our contemporary refers to the case of a man who was repairing an overhead line at Radcliffe, when a short circuit was caused, which resulted in an explosion, throwing the man from the top of the pole to the ground. That was bad enough; but he also suffered severe burns on his arms, and his head and face were also injured. And electrical people talk of the safety and reliability of electricity! It has a peculiar and varied way of showing it.

Electrical Troubles.

Big electricity supply interruptions at times result from small causes. Some time ago we reported a failure of the electricity service at Aberdeen through a mouse entering one of the E.H.P. cubicles, and causing a short circuit. Darkness reigned for some thirty-five minutes where electric light should have been; the tramway traffic was held up; and electric power in the factories was cut off. A report has been made as to the damage occasioned at the main generating station by the straying rodent. To repair the damage, it is stated, will cost £1700 to £1800. The visitor was an expensive one for the Electricity Department.

An Expensive Visitor.

For boiling water by electrical means, the self-contained kettle stands in the forefront in respect of efficiency. But such kettles are expensive; their maintenance costs are not low; and when anything goes wrong with the heating element, it is usually necessary to send the appliance on a railway journey to the makers for repair. The general thing now is to advocate that a self-contained kettle should accompany every electric cooker sent out, which is an acknowledgment that the boiling of water by kettle and the ordinary hotplate element is an uneconomical process. But the greater economy of the electric kettle in respect of current is discounted by its first cost and the expense of repair when anything goes wrong. In connection with their supply with a cooker, opinions widely differ as to the advisability of making provision of a convenience outlet a standardized feature of the latter. The matter is discussed by the writer of "Cooking and Heating Notes" in the "Electrical Times." It seems that some supply engineers insist on a convenience outlet being fitted on all cookers let on hire; but manufacturers are generally adverse to the practice. It is acknowledged that the kettle is "a necessary accessory for the most economical operation," and so it should be supplied to every user. And then the question, what is more natural than to provide a convenience outlet on the cooker itself? But the obvious is pointed out—that permanently live sockets, as nowadays fitted at the side or in front of the cooker, are a possible source of danger. Usually they are quite accessible to small children. Then again, there is the risk of the flexible being damaged by heat from the hotplates; while a fault in the kettle is liable to make the whole cooker alive if it happens to be standing on the hob. Naturally, a separately wired socket mounted fairly high up the wall at the back or to the side of the cooker is safer; and it seems to our friend that all the varied requirements might be met satisfactorily by manufacturers making the convenience outlet a detachable fitting. All these things, however, cost additional money. Here, for instance, it is suggested that the case would be met by a bracket which could be fitted at the side or back of the cooker. This could be provided with a convenience outlet ready wired, and fuse protected, with suitable leads for connecting-up to terminals on the cooker. If thought desirable, too, an insulated platform could be provided on which to stand the kettle. The troubles of electricity in the cause of consumption economy are not light; and to lower consumption for a given amount of work is usually a costly process.

Acknowledged Drawbacks.

We cannot help referring to the dénouement of the little story on this subject which was opened by Mr. R. Egerton Green, and which has been mentioned in the "Memoranda" on two previous occasions. It will be remembered that this gentleman required an electric power supply for his flat; but the local Company said it could not be given unless he paid them for an additional main up to the flat, as the one in existence was incapable of bearing the extra load. He resented having to do this—being, however, quite willing to pay any expenses from his own hall door or meter. The result is that the Gas Company have fitted up this electrical contractor with (let us put it in his own words) "a fine new fire, with no 'groans' about supply mains, and no charges other than paying for the gas I burn, and a nominal hire charge per quarter for the fire." All's well that ends well; and Mr. Egerton Green will find the gas-fire more economical than an electric one of the same heating capacity.

Electrical Apathy and Gas Enterprise.

Of course, there is no such thing. But the nearest approach to it has been produced by the United States Navy in the new battleship—the "*Colorado*"—which has recently visited Portsmouth. From propelling to steering machinery, it is said, everything aboard the ship is electric. Even the potato peelers and the ice-cream freezers are electric. The attention of the trade unions should be called to this electrical phase and craze. The protectors of labour and those who seek to advance its interests in this country are crying aloud for the nationalization of electricity, and for its supply at such a rate that manual operation could be largely dispensed with by the work being done electrically. It is obvious that these myopes are urging for something that would, if their ideas materialized, assist in the creation of more unemployment. Manual service is not required for even potato peeling on the "*Colorado;*" the quartermaster is a piece of electrical apparatus; and musicians are not required as pianos are played electrically. The Labour Party should study the matter to ascertain if they are not thinking to befriend an agent which will not be of the greatest value to them in maintaining a good diversity of employment. But in this all-electric ship, we learn that that most important of operations—cooking—is performed by the heat of steam. Then how can the "*Colorado*" be called "all-electric?" It reminds us of a large emporium which, it has been stated, has an all-electric kitchen, but in which the heaviest cooking work is accomplished by steam. And we know that associated with the apparatus that is electrical there are maintenance costs which, if the total applicable to the cooking apparatus were known, would be a surprise to certain individuals who proclaim that such costs are negligible.

The All-Electric Battleship.

There has been a considerable amount of writing in "The Times" lately on smoke prevention and more sunshine, and the means of securing such highly desirable conditions. The "Electrician" in commenting on a letter by Sir Maurice Abbott-Anderson, to which editorial reference was made in our own columns on Jan. 9, refers to the statement that "electrical engineers have a long way to go before any but wealthy persons can contemplate the use of electricity for the many domestic purposes for which coal or gas is now used." Our contemporary says: "Though this may not be the whole truth, it is sufficiently true to demand the most earnest consideration. The price of electricity for domestic purposes, especially in London, must be reduced. Equipment is available which would at once solve the domestic smoke problem. The public are ready to use it, but are frightened of the cost." That is beautifully frank. It is not always so openly confessed that the cost of electric heating is enough to frighten people. But it is true. Experience teaches this, to the advantage of the suppliers of gas and of the makers and fitters of gas-fires. But the "Electrician" says the price of electricity "must" be reduced for domestic purposes; it does not say what is the maximum figure at which it can be supplied to enable it to compete on equal terms with other heating agents. It would be interesting to have this omission repaired.

Electric Fires and the Smoke Problem.

Sliding-Scales of Prices and Profits.

There are two Bills in Parliament proposing to deal with the electricity supply of London—a problem the entanglements of which have hitherto defied any solution which is generally acceptable to all the parties concerned. The greatest difficulty has been with the companies. The County Council have the right to acquire the electricity undertakings in 1931; but a provisional agreement was drawn up a few months ago under which the lives of the companies were to be extended for forty years—that is, to 1971—when they could be taken over. But the companies are to accept a sliding-scale of prices and profits—not necessarily on the same terms as, but on similar lines to, those existing in the gas industry. This sliding-scale would begin to operate in 1932—the year succeeding the one when, in present circumstances, the companies could be taken over. The details of the sliding-scale were not settled. But it is looking far ahead, and conditions may in the meantime substantially alter. It now seems that the companies are not in agreement on points of detail. As mentioned above, two Bills have been lodged in Parliament; and upon both of them no doubt the Electricity Commissioners will have something to say if they do not fit in nicely with their own plans. However, the sliding-scale proposals interest us. One Bill is being promoted by the County of London Company. It contemplates a sliding-scale to be fixed either on the basis of an annual return of 8½ p.ct. on all the capital employed, or a sum equal to the profits earned in 1923, whichever is the greater. The maximum charge is put at 8d. per unit for lighting, and 4d. per unit for power, with the condition attached that excess profits shall go half to the companies and half to the consumers in the shape of lower prices. In the gas industry, the consumer obtains a larger share than one-half. The second Bill is being promoted by the Electricity Joint Committee (1920), Ltd. It provides that the Joint Electricity Authority for London, when set up, shall delegate its powers to two Sub-Committees—one composed of the municipal electricity suppliers of London, and the other comprising entirely representatives of the supply companies. The latter, it is proposed, should take over the generating plant of all the companies—leasing it at a rental, and supplying the companies with current at a price which will give no profit. In other words, they will be bulk producers at bare cost. Provision is made for a sliding-scale of prices and profits, with the details to be agreed between the promoters of the Bill and the County Council. We are anticipating that the Electricity Commissioners will look with greater favour upon the second Bill than the first one, having regard to their last scheme for London, which resulted in litigation.

THE HOUSING PROBLEM.

A small pamphlet has reached us entitled "The Housing Problem, and the Way Out; with Notes on Unemployment." It has been prepared by the Housing Adviser to the "Brotherhood Movement;" and its purpose is to demonstrate that houses can be built as an economic proposition when reasonable numbers are erected at one period in a given area. No one can deny that housing is a vital matter to the welfare of the individual, and through him to the vitality of the nation; and it will readily be agreed that any effort which seeks a solution to the present state of chaos, and which aims to put an end to the unrest arising therefrom, is all to the good. The social structure of this country is built up on family life, which in turn is based on what may be termed "family accommodation." Unless such dwellings exist—which at the moment is not the case—the moral fibre of the nation must inevitably depreciate, for man is a mental-physical entity, and anything which tends to lower the physical tone has a rapid and certain effect on mental and moral standards.

The little booklet draws attention to the impetus of public opinion, and remarks that the potent agency for its healthy direction is divided between the Church, the Press, and such organizations as the Brotherhood Movement, the ideals of which are set out in brief form. Of course, it is an easy matter to apply destructive criticism to a pamphlet of this nature, and to point to the correct assessment of rosy verbiage in the light of a knowledge of human nature; but we will not fondle this aspect of the publication. Several schemes are put forward as being practical, and the arguments are strongly backed up by facts and figures. Another section deals with the utilization of mineral waste and colliery foul as a concrete aggregate for building purposes, the erection of walls out of stone lying waste, and other ideas of a constructive nature having as their object the absorption of part of the vast army of unemployed. The publication is of considerable interest; but it must be confessed that the following paragraph was not read without a little amusement. "British Empire honours, such as the O.B.E., were available during and after the war to many who served their fellows and country with distinguished services. What a magnificent opportunity for the Prime Minister to recommend His Majesty the King to introduce some such Honours League for social services rendered in the manner previously described." This, following on a plea for a general recognition of the true meaning of service, savours somewhat of incongruity.

GAS ACTS FOR 1923.

MOST of the Acts in which gas affairs were dealt with in the last session of Parliament are now to hand; and we have examined them—principally with the view of ascertaining how far there has been any departure from the provisions of the Bills as noticed in the "JOURNAL" for Feb. 14 last year [p. 385].

The BARNSLEY CORPORATION sought in their Bill compulsory powers for acquiring part of the private railway siding of the Gas Company, and a small area of land near thereto or easements thereover, for the benefit of the adjoining electricity works. But the Act shows that there is now to be a deviation of the existing railway siding from the Barnsley to Barnetby Branch Railway of the Great Central Railway to the electricity works. The Corporation may enter into, and carry into effect, agreements with the London and North-Eastern Railway Company and with the Barnsley Gas Company with respect to the construction, maintenance, working, and user of the railway siding authorized by the Act. In connection with the power to take lands, the Corporation are not, except by agreement, to enter upon or take or use any lands of the Barnsley Gas Company. The Act also includes provisions regulating the retail sale of coke. [*Parliamentary Agents: Messrs. Torr, Durnford, & Co.*]

The BIRKENHEAD CORPORATION Act contains a number of clauses dealing with the Gas Department. These are of quite ordinary character. Among them we see the provision to which the railway companies are now taking such strong objection in connection with Special Orders. That is the one referring to the supply of gas, on a new demand being made, from mains of insufficient capacity. Power is also taken to supply or purchase gas in bulk; but nothing in the section is to authorize the Corporation to lay mains in, or interfere with, any street beyond the borough. In the financial section of the Act, it is provided that, notwithstanding any enactment relating to the application of the revenue of the tramway, water, gas, electricity, or ferries undertakings, the Corporation may (if they think fit) apply money received by them on account of the revenue of any of the undertakings in their construction, renewal, extension, and improvement, and in the provision of funds for working capital, provided the money is so applied after the working and establishment expenses of the undertaking, and the interest and sinking fund payments in respect thereof, have been provided for. Confirmation is also given to the agreement entered into on June 25, 1915, with the Hoylake and West Kirby Gas and Water Company, defining the limits for the supply of gas and water in Bidston. The parties cede to each other certain portions of territory in that parish. [*Parliamentary Agents: Messrs. Sherwood & Co.*]

In a voluminous Act, the CHESTERFIELD CORPORATION have a part dealing with gas affairs. It is prescribed that the gas limits shall be the borough, the urban district of Brampton and Walton, and the parishes of Barlow, Brimington, Calow, Duckmanton, Hasland, Temple Normanton, and Wingerworth in the rural district. The works clause has appended to it the one-third purchasing restriction in respect of secondary products. Clauses of usual form follow, relating to the laying of pipes in private streets, and for ancillary purposes—such as the conveyance of oil and other materials. A subsequent clause gives the Corporation authority to supply gas for lighting, heating, motive power, warming and ventilating, and other purposes, and for the particular requirements of any trade, industry, manufacture, or business, on such terms and conditions in all respects as may be agreed between the Corporation and the person supplied. An interesting section is the following:

> Whenever the total of the moneys received by the Corporation for the supply of gas after the commencement of this Act shall exceed by more than £2000 the total of the following sums (that is to say):
>
> (*a*) The amount of the requisite appropriations, instalments, or sinking-fund payments in respect of money borrowed for the purposes of the gas undertaking;
>
> (*b*) The amount of the working and establishment expenses and cost of maintenance of the undertaking including all costs, expenses, penalties, and damages incurred or payable by the Corporation consequent upon any proceedings by or against the Corporation, their officers or servants in relation to the undertaking;
>
> (*c*) The amount of any interest payable in respect of money borrowed by the Corporation for the purposes of the undertaking;
>
> (*d*) The amount (if any) set aside in respect of the undertaking under the provisions of the section of this Act whereof the marginal note is "Reserve funds,"
>
> then the charges for the supply of gas to be made in the next succeeding year shall be reduced to an extent equivalent to the amount of such excess over £2000—provided that, if it appears from estimates in respect of the next succeeding year that the estimated total of the moneys to be received by the Corporation in respect of such next succeeding year will be less than the total of the said sums in respect of that year, then the reduction in the charges to be made shall be equivalent only to so much (if any) of the amount of such excess as would not be required to make the said totals equivalent.
>
> The Corporation shall keep an account and prepare an estimate for the purposes of this section so as to show under separate headings the several items mentioned herein.

For the purpose of the Gas Regulation Act, it is enacted that the prescribed testing-place is to be provided on the gas-works, this within three months after the commencement of the Act. Another clause provides for the supply of gas apparatus, engines,

&c.; and a later one removes from the Corporation the obligation to give from any main a supply of gas for any purpose other than lighting or domestic use in any case where the capacity of the main is insufficient for the purpose, or if the new supply would, in the opinion of the Corporation, interfere with the sufficiency of the gas required to be supplied by means of that main for lighting or domestic purposes. There is a proviso that the clause is not to apply to any main used by the Corporation for the supply by them of gas under a contract entered into for the sale of gas in bulk. There are a number of other clauses of general form—one of them enabling the Corporation to supply or purchase gas in bulk, with the provision attached that they are not to supply gas under this section unless they are satisfying, and will continue to satisfy, the requirements of the consumers of gas for all purposes within the gas limits. Power is also conferred to enter into agreements for the purchase of coke-oven gas. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

The HOYLAKE AND WEST KIRBY GAS AND WATER COMPANY have in their Act the complete scheme (as submitted in their Bill) of reincorporation, with a common capital for both undertakings, to eliminate the confusion which has hitherto arisen as to the rights and interests attaching to the several classes of shares and mortgages, and which led the Committee of the Liverpool Stock Exchange in 1913 to withdraw the quotation of the Company's shares from their official list. It is obvious that this has been prejudicial to the issue of, and dealings in, the Company's shares and mortgages. However, this will in future be obviated with the acceptance of the scheme by Parliament. The details were fully set out in our issue for Jan. 10 last year; and reference to the information then given will show what has been confirmed by the Act. The same applies to the new capital and borrowing powers.

Separate accounts are to be kept in respect of capital expenditure and revenue of the gas and water undertakings. An account (to be called "the interests and dividends account") is to be kept, to which are to be transferred prescribed amounts, out of which are to be paid interest and dividend on mortgages, debentures, and stocks. The amount to be transferred to the interests and dividends account from the profit and loss account of the gas undertaking in any year is not to exceed: (*a*) Such sum as may be necessary to pay the interest or dividend for that year on mortgages, so much of the £16,050 redeemable preference stock as for the time being may be unredeemed, and on such capital moneys as for the time being shall have been raised by the Company by the issue of mortgages, debentures, or debenture stock or on loan by way of overdraft or otherwise, or by the issue of preference stock, and shall have been properly appropriated to the gas undertaking. (*b*) A sum calculated at the rate of 7 p.ct. on £30,918, being the portion of the ordinary stock in the original capital created by this Act, which represents the gas share capital of the Limited Company; and such capital moneys as for the time being shall have been raised by the Company by the issue of ordinary stock in the additional capital. Provisions follow as to the amount to be transferred to the interests and dividends account from the profit and loss account of the water undertaking. If the clear profits of the gas or the water undertaking in any year (after appropriating and setting apart such sum or sums as may be determined to any fund or funds authorized by the Act) amount to a larger sum than may be transferred in that year from the profit and loss account of that undertaking to the interests and dividends account, the excess may be carried to the credit of the profit and loss account of the undertaking for the next following year; but the balance standing to the credit of the profit and loss account must not at any time exceed the maximum amount transferable from the profit and loss account to the interests and dividends account in respect of the preceding year. The profits to be divided among the holders of the preference capital in any year are not to exceed 7½ p.ct. on the £16,050 redeemable preference stock, or 7 p.ct. on such preference stocks as may be created under this Act.

For the purpose of providing for the redemption of the capital moneys expended on or in the acquisition of leasehold premises for the purpose of the gas or the water undertakings, or either of them, the Directors may, in any year out of the revenue of either or both of the undertakings as the case may require, transfer such sums as may be proper to a fund to be called the "Leasehold Redemption Fund." This is to be applicable only to replace the capital moneys expended on or in connection with any lease of such premises, or to acquire the renewal of such lease or the reversion expectant thereon; and the amount standing to the credit of the fund is not to exceed the amount of those capital moneys which may for the time being be unredeemed. Provision is made for the investment of the moneys constituting the fund. Authorization is given to the creation of a special purposes fund, and to the utilization of the reserve fund of the Limited Company. The money or securities standing to the credit of the water contingency and plant renewal fund of the Limited Company are to be credited to a gas and water contingency fund which is to be established, and may be maintained, under and pursuant to the provisions of section 122 of the Companies' Clauses Consolidation Act, 1845. Provision is made for annual meetings. To the works clause the one-third limitation to the purchase of secondary products is appended.

In the original Bill, the standard price of 18·5d. per therm was suggested; but in the Act the figure appears as 13·6d. per therm. To this the sliding-scale is applied on the basis—in respect of any half-year during part of which the price charged has been 0·2d. above the standard, the amount of divisible profit shall (in respect of each 0·2d.) be reduced below the amount of divisible profit, if calculated at the standard rates, by 2s. 6d. p.ct. In respect of any half-year during the whole of which the price charged shall have been 0·2d. below the standard price, the amount of divisible profit may be increased by 2s. 6d. p.ct. The charge for the hire of a prepayment meter and fittings is to be 3d. per therm if a cooking-stove is included, and 2·5d. per therm if one is not included. The charge for the hire of a prepayment meter without fittings is to be 1·5d. per therm, or 10 p.ct. per annum on the cost of the meter, whichever is the higher. In the Bill, a calorific value of 450 B.Th.U. was mentioned; but in the Act it has been altered to 540 B.Th.U. Sections appear as to the variation of calorific value, adjustment of consumers' burners, and the pressure of gas. All these are in the ordinary form, with the one exception that the pressure provisions are not to apply to the portion of Hoylake and West Kirby known as Great Meols, until the expiration of six months, during which the pressure is to be not less than 6·10ths of an inch, and from sunset to midnight not less than 8·10ths of an inch, at the main or as near as may be to the junction therewith of the service-pipe supplying each consumer. A number of other provisions of usual character are included; and one of the final clauses repeals the power of the Birkenhead Corporation to supply gas and water in portions of the parish of Bidston-cum-Forde. [*Parliamentary Agents: Messrs. Torr, Durnford, & Co.*]

The MACCLESFIELD CORPORATION have obtained an extensive Act, one part of which refers to the gas undertaking. In this there is a large number of clauses nowadays of customary form. Among them, it is observed that the Corporation have obtained power to supply gas in streets not dedicated to public use, provided that they are not to exercise these powers with respect to any street or road belonging to any railway company or railway committee except with their consent. But such consent is not to be unreasonably withheld; and should there be any difference between the parties, it is to be determined by arbitration. The clause is incorporated relieving the Corporation from obligation to give a supply from any main for any purpose other than lighting or domestic use in any case where the capacity of the main is insufficient, or if and so long as the supply would in the opinion of the Corporation interfere with the sufficiency of the gas required to be supplied by means of such main for lighting or domestic purposes. The supply of gas to an asylum, institution, or hospital is for the purpose of this section to be deemed to be for lighting or domestic use. Differential prices are arranged for according to the purpose for which the gas is used, as may be agreed upon between the Corporation and the person taking the supply, provided that the Corporation shall not give any preferential price as between consumers who take a corresponding supply for the same purpose in similar circumstances. The Corporation have the right to discontinue the supply to any consumer who uses the gas for any purpose other than that for which it is supplied. Before discontinuing it, however, they must give to the consumer seven days' notice in writing of their intention; and in the notice they are to specify the respect in which the gas is used contrary to the terms of the agreement. Passing over several other clauses, we come to one which enacts that a prepayment meter register shall be *primâ facie* evidence of the quantity of gas consumed, in respect of which any gas-rent is charged and sought to be recovered by the Corporation, provided that, if the Corporation and the consumer differ as to the quantity consumed, the difference is to be determined, upon the application of either party, by a Court of Summary Jurisdiction, who may also order by which of the parties any costs of the proceedings shall be paid. Another provision gives the Corporation the power to supply or purchase gas in bulk. Power-gas clauses in the usual form also appear, together with the customary regulations.

In the financial section of the Act, it is noticed that the Corporation have obtained authority to borrow £23,310 for the construction of a purifier and gasholder; the period of repayment to be twenty years from the date or dates of borrowing; also £8000 for the provision of gas stoves, fires, and fittings, with a repayment period attached of ten years; further, £12,000 for mains, plant, and general purposes of the undertaking, with a repayment period of twenty-five years; and, finally, £25,000 for working capital, the repayment period being ten years. As from April 1 of last year, all money received by the Corporation on account of the revenue of the water and gas undertakings (including the interest of any reserve fund when it amounts to the prescribed maximum) is to be carried to the borough fund; and all payments and expenses made and incurred in respect of the undertakings are to be paid out of the fund. From the same date, the Corporation are to keep their accounts in respect of the water and gas undertakings so as to show under separate headings or divisions on the one side all receipts in respect of the undertaking, and on the other side all payments and expenses. Such payments and expenses are to be divided so as to disclose the amounts expended or set aside in respect of: (*a*) The payment of the working and establishment expenses and cost of maintenance, including all costs, expenses, penalties, and damages incurred or payable by the Corporation. (*b*) The payment of interest on borrowed money. (*c*) The provision of the requisite appropriations, instalments, or sinking-fund payments in respect of money borrowed. (*d*) The provision of a reserve fund by

setting aside an amount (not exceeding in any one financial year a sum equivalent to ½ p.ct. upon the total capital expenditure) as the Corporation may from time to time think reasonable, and investing the same and the resulting income in statutory securities, and accumulating the same at compound interest, until the fund amounts to the maximum for the time being prescribed—not exceeding (1) in the case of the water undertaking a sum equivalent to one-tenth of the aggregate capital expenditure for the time being, and (2) in the case of the gas undertaking one-fifth of the aggregate capital expenditure. [*Parliamentary Agents: Messrs. Sharpe, Pritchard, & Co.*]

(*To be continued.*)

THE UTILIZATION OF LOW-GRADE AND WASTE FUEL.*

A volume dealing with the methods of utilizing low-grade fuel is particularly opportune at the present moment, when the problem of conservation of the fuel resources of the nation is so much to the fore. The term "waste" fuel points the moral; no fuel should be described as "waste." But the author uses the term in the popular or colloquial sense; as soon as we take his advice on its utilization, it ceases to be "waste."

The volume by Mr. Goodrich treats the subject in a thorough and attractive manner, and its appeal will naturally extend far beyond the confines of the gas industry; but there are several chapters of peculiar interest to gas engineers—notably "Coke Breeze" (Chapter V.), "Fuel Recovery" (Chapter VIII.), "Gasification of Low-Grade and Waste Coal" (Chapter X.), and the last four chapters dealing with boilers, furnaces, boiler-house equipment, and control. To a limited extent, also, the notes in the first chapter on the production of coal and lignite in the British Empire and outside it, as well as the briquetting processes and analyses in Chapter VII., will be read with interest.

The statistics regarding the performances of boilers using coke breeze, and the excellent chapter on boiler-house equipment, are worthy of close study by gas engineers, for the gas-works can, by setting a good example, show what can be done with fuels other than coal, thus stimulating the general use of smokeless fuel. The effect should be to enhance the price of breeze, or, alternatively, to enable all the works production to be self-consumed, so saving the higher form of fuel for the outside market. With regard to the performances of boilers fed with coke breeze, it is a pity the author could not find space for more than a couple of pages to devote to description and advice relating to the various forms of forced-draught furnaces. The comprehensive chapter on "Furnaces and Firing" deals entirely with sprinklers, chain-grate stokers, and mechanical stokers generally; and the more humble type of appliance has probably been crowded out.

The chapter on "Boilers" contains some sound advice on the matter of the evaporative duty of internally-fired boilers on low-grade fuel, and the desirability of having an ample capacity—otherwise the boiler may not do the work expected, or the forcing will render the use of low-grade fuel a loss rather than a gain. This chapter might have been enlarged to advantage by including reference to the waste-heat boiler, for the heat usually diverted to the chimney shaft may fairly be described as low-grade or waste fuel. The author seems a little low in his figures for the calorific value of coke breeze—8500 to 10,500 B.Th.U. per lb. His twenty odd examples in the text vary from 8610 to to 12,100 B.Th.U., with an average of about 10,000 B.Th.U. The ash, given at 10 to 15 p.ct., varies in these same analyses from 13·4 to 29·3 p.ct., with an average of 18·8 p.ct.

The index is not copious, but this is compensated for by the admirable dissection and arrangement of the chapters, and the full list of tables and illustrations, coupled with a bibliography of all the notable works on this and cognate subjects. The author has produced an up-to-date and authoritative volume, which forms a useful addition to the gas man's library. The lucidity of the text and the clearness of the well-chosen illustrations should make the reading (whether one be student or expert) a profit and pleasure.

G. E.

* "The Utilization of Low Grade and Waste Fuel," by Mr. W. F. Goodrich. Pp. 368. London, Ernest Benn, Ltd. Price, 42s. net.

British Engineering Standards Association.—The Association have recently drawn up a specification for the determination of viscosity; their work being embodied in Publication No. 188—1923, "British Standard Method for the Determination of Viscosity in Absolute Units." The specification includes standard dimensions for U-tube, co-axial bulb, and falling sphere viscometers, and the standard liquids recommended for their calibration. The use and calibration of the instruments are described in detail, and the methods of determining the viscosity of opaque liquids by means of the Lidstone viscometer and by the adaptation of the tube and falling sphere viscometers are discussed. Copies of this publication are obtainable from the British Engineering Standards Association, Publications Department, No. 28, Victoria Street, S.W. 1.

SPONTANEOUS COMBUSTION OF COAL.

At the Birmingham University on Jan. 15, Mr. J. Ivon Graham, M.A., M.Sc. (Assistant Director of Mining Research at the University of Birmingham), read an important paper on "The Spontaneous Combustion of Coal" before the members of the Birmingham and Midland Section of the Society of Chemical Industry. Dr. E. B. Maxted, Chairman of the Section, presided.

Two main theories regarding the spontaneous combustion of coal have been held for years—one that iron disulphide or pyrites is the principal cause, the other that spontaneous combustion is the result of oxidation at ordinary temperatures of the organic substances contained in the coal. It is now certain that in some cases spontaneous heating results from the rapid oxidation of pyrites when the latter is in a finely-divided condition. Various researches on the oxidation of coals from different seams throughout the country have shown that: (1) Coals like anthracite and Welsh steam coals, which have a small capacity for absorbing oxygen, are not likely to fire; (2) some coals which show a low rate of oxidation at ordinary temperatures may fire when mixed with pyritic material; and (3) coals which show a high rate of oxidation, which increases with rise of temperature, may give rise to fires. Many bituminous coals are included in the latter class.

Up to 1913 most of the laboratory research in the oxidation of coal was concerned with the behaviour of coal at temperatures above 100° C., but did not throw much light on the actual course of the heating of coal from a normal temperature. Experiments were made in that year at Doncaster to trace the oxidation of various parts of the Barnsley seam; a variety of samples, including fusain, being tested in a moist condition. The rate of absorption and the total volume of oxygen taken up increased with rise of temperature. As to the influence of the size of the particles, the absorption rate, though increasing with fineness of division, was not found to be proportional to the mesh of sieve used.

Regarding the influence of pyrites, Mr. Graham observed that varying views were held by investigators. That the pyrites theory did not explain all cases of spontaneous combustion was clear from the Doncaster Laboratory experiments on the Barnsley seam samples. In other cases, however, the facts pointed to the pyrites being the principal contributory cause. Associated with some seams are bands of inferior material containing pyrites, and many were found to be particularly liable to heating. The reaction generally believed to take place during the oxidation of pyrites is given by the equation:

$$FeS_2 + 7O_2 + 2H_2O = 2FeSO_4 + 2H_2SO_4.$$

Ferric sulphate may also be formed, but, generally, not to any considerable extent until all the pyrites has disappeared, since ferric sulphate is reduced by the latter. The belief is common that cases of spontaneous combustion in coal heaps are more prevalent after showery weather. The author's explation of this is that pyrites oxidation is accelerated through the removal of the products; and the warm solution of these, passing to other parts, helps to start the oxidation of fresh material.

Discussing the part played by moisture, the author said that its influence is probably connected with the greater ease of oxidation of substances of ulmic nature containing hydroxyl groups. Bacterial action seems improbable from the experimental results. The author's results for the oxidation of durain, clarain, and vitrain agree in general with those of Wheeler and Tideswell, but differ markedly in respect to fusain. The author has found that fusain samples from a number of different sources all show only slight absorption.

History and Uses of Fused Silica.—Sir Richard A. Surtees Paget, Bart., is to read a paper next Wednesday, Jan. 30, at 8 o'clock, before the Royal Society of Arts, John Street, Adelphi, on "The History, Development, and Commercial Uses of Fused Silica."

Wills.—Mr. William John Leonard, senior partner of Messrs. Carless, Capel, and Leonard, of Hackney Wick, who died in September, aged 64, left £389,023, with net personalty £384,815. Mr. Frederick H. Pilley, coal factor, of St. Dunstan's Alley, E.C., who died last October, aged 84 years, left unsettled property of the gross value of £280,586, with net personalty £275,977.

New Holder at Middlesbrough.—In a paragraph on p. 97 of our issue for Jan. 9, it was intimated that the Middlesbrough Gas Committee had decided to engage a consulting engineer to advise on the site, the form, &c., of a new 3 million c.ft. holder and tank. The Committee have also suggested that the land adjoining the proposed site should be acquired for future developments. We understand that Mr. W. Doig Gibb, O.B.E., M.Inst.C.E., has been retained as consultant.

Gas Light and Coke Company's Dividend.—The accounts of the Gas Light and Coke Company for the past year show that, subject to audit, the balance to the credit of the net revenue account will enable the Directors to recommend the payment of dividends for the half-year to Dec. 31 last as follows: On the 4 p.ct. consolidated preference stock, at the rate of 4 p.ct. per annum; on the 3½ p.ct. maximum stock, at the rate of 3½ p.ct. per annum; and on the ordinary stock, at the rate of £5 6s. 8d. p.ct per annum — carrying forward to the next account the sum of £227,295 1s. 4d.

FUEL RECOVERY FROM PAN ASH.

Dry-Magnetic Separating System.

The recovery of fuel from gas-works pan ash is an old problem, and many plants have been built at one time and another for this purpose; but they have depended for their operation upon the difference in specific gravity between the fuel to be recovered and the incombustible to be removed. The Fuel Recovery Syndicate, Ltd., of Westminster Palace Gardens, Victoria Street, S.W. 1, have acquired the sole licence for the construction and exploitation of an effective process, based upon an entirely different principle, to recover these valuable combustibles.

The process, which is patented, is founded on the discovery that ashes are attracted by highly-concentrated magnetic fields, whereas no influence is exerted on coal and coke. This is explained by the fact that the ferrous non-magnetic material contained in every kind of coal, though in very fine distribution, is converted during combustion into magnetic iron compounds, which pass into the ash or clinker, and make it susceptible to magnetic attraction. Furthermore, these magnetic iron compounds are concentrated in the ash in inverse proportion to the percentage of ash contained in the fuel. Tests of over 1000 samples of ashes of various origin have proved that the ash or clinker of all kinds of coal is susceptible to the influence of powerful magnetic fields. Magnetic separation has also been successfully applied to brown coal (lignite) ashes.

The proportion of unconsumed combustibles in the ashes will vary according to the quality of the coal and the way in which it is burnt. Numerous tests of furnace refuse have shown that the recovery of coke and coal on the average exceeds 30 p.ct. of the weight of crude ashes; while in the case of many industrial furnaces the yield of fuel has amounted to 50 p.ct., and in several instances it was even higher.

Over 150 of these ash-separating plants capable of treating upwards of 1,000,000 tons of ashes per annum (based on an eight-hour day) are already installed on the Continent, in units of 1 to 20 tons per hour, at various industrial works, gas-works, railways, electric power stations, &c., and are giving every satisfaction. Plants to be installed in this country will be manufactured here.

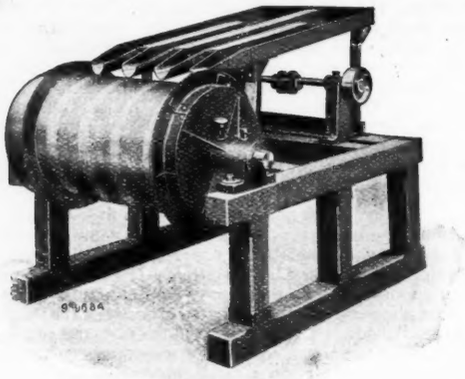


Fig. 1.—Magnetic Drum and Shaking Feeder.

The Process.

The arrangement of a dry-magnetic ash-separating plant is, of course, determined by local conditions and the capacity required. For capacities ranging from about ½ up to 2 tons of crude ashes per hour, one magnetic drum will be sufficient, the same being provided with from one to four magnetic fields (see fig. 1). The ashes are uniformly fed to the magnetic drum by a shaking tray or shaking screen. On the drum the separation of the clinker from the coke and coal is effected by the clinker being attracted by the powerful magnets enclosed within the drum, and adhering to it until, after half a revolution, it passes out of the magnetic field and drops away, while the coke and coal particles, not being attracted, have been thrown off before this stage. In most cases it is advisable to screen the ashes on their way to the separator into two or more classes, which are automatically conveyed to two or more magnetic fields formed on the drum, the larger material naturally requiring a more intense magnetic field than the smaller grades. Installations of this kind can also be arranged as travelling plants; and in this way the ashes can be treated where they are produced, either at different places in a works or even at different works.

It will be at once appreciated that the above system offers a number of advantages over washing or flotation processes. In the first place, the fuel is recovered in a dry state, and it may be at once re-charged into the producers or furnaces; secondly, any coal which may have passed through the furnace unconsumed, being non-magnetic, is recovered with the coke; and, thirdly, a considerably increased yield is obtained by the magnetic process, as the fuel in the fines, which wet processes are unable to treat, is also recovered—in some instances the majority of the combustible material is contained in these fines, while they always constitute a large proportion. This recovered small fuel is burnt quite easily, so long as a good draught is available.

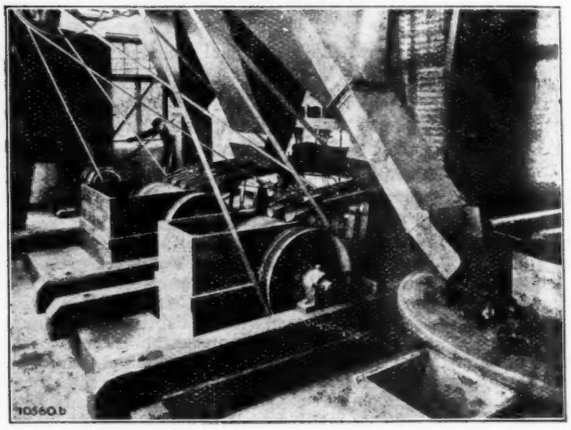


Fig. 3.—Showing Drums in Operation and a Picking Table for Material over 3 in.

The magnetic process is extremely simple, and is unaffected by climatic conditions. It may be installed without difficulty in any industrial works; and it dispenses with all settling tanks, pumps, drainage appliances, &c., connected with the wet process. It is, moreover, of considerable import that the slag or clinker extracted by the process is especially suited for the manufacture of clinker bricks, which as far as possible must be free from any admixture of coal or coke; whereas in the case of the wet process the unburnt coal, being comparatively heavy, accompanies the clinker, and consequently impairs the durability of the bricks made therefrom. The manufacture of these clinker bricks on the Continent, in conjunction with the recovery of fuel by means of the magnetic process, has achieved considerable proportions, with great profit to the manufacturers; and it is only a matter of time before the prejudice against clinker bricks in this country is allayed.

The question whether the installation of a dry-magnetic plant will prove profitable mainly depends on the quantity of ashes available and the percentage of unburnt fuel still contained in them. In many cases the initial outlay can be written off after one year's working, and under favourable conditions such as

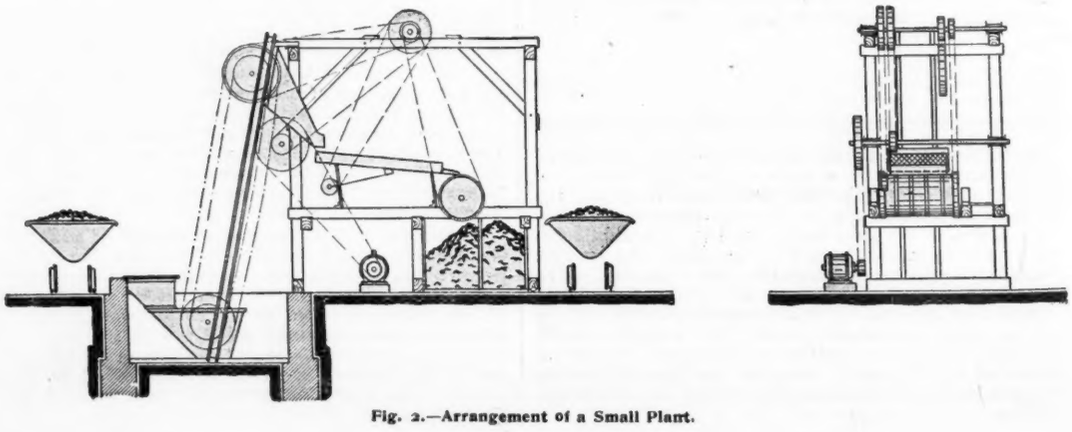


Fig. 2.—Arrangement of a Small Plant.

obtain in gas-works, where an ash rich in fuel is made, within a considerably shorter period. The operating expenses are small, the magnets requiring for their excitation about 0·8 to 1 KW. per ton of ash treated; while for driving the separator, including the shaking feeder, about ¼ to ⅜ H.P. is needed, according to its size.

SOME RESULTS.

Below are given the results of treating magnetically some different sorts of ash. The results of gas-works pan-ash treatment by this process were given in our issue of Nov. 28 last year [p. 576].

Results of Magnetic Treatment of Ashes from Various Sources.

1	Ash from Producers.		
Grading Inches.	Ash Residue per Cent.	Coke and Coal Recovered.	
		Per Cent.	B.Th.U. per Lb.
Above 3 . . .	4·6	..	..
3 to 1½	28·8	9·2	12,200
1½ to ⅛ . . .	32·9	8·7	12,300
⅛ to 0	14·9	0·9	8,600
Total . . .	81·2	18·8	12,000

2	From a Boiler Ash Pit.		
Grading Inches.	Ash Residue per Cent.	Coke and Coal Recovered.	
		Per Cent.	B.Th.U. per Lb.
3 to 1½	32·3	..	..
1½ to ½	8·85	12·75	11,800
½ to 0	24·5	21·6	11,600
Total . . .	65·65	34·35	

3.	Ashes Dropped through the Grate of a Boiler-Furnace.		
Grading Inches.	Ash Residue per Cent.	Coke and Coal Recovered.	
		Per Cent.	B.Th.U. per Lb.
Above 1½ . . .	3·5	..	..
1½ to 0	48·8	47·7	10,680
Total . . .	52·3	47·7	..

TULLY GAS AND THE ECONOMICAL THERM.

By C. B. TULLY, of Newark.

As a result of a policy of improving and developing the Tully Patent Gasification Plant, much research has been carried out at the works during the past year, as a consequence of which it has been possible to effect considerable advances in the design and construction of the apparatus. Three types of Tully plant are now built:

Type No. 1.—The simple type, with generator and washbox.

Type No. 2.—The same type as No. 1, but with the addition of a carburettor, which enables any desired calorific quality of gas to be obtained by the use of oil.

Type No. 3.—The 1923 Tully twin generator plant.

TYPE NO. 1.

This is the original type of Tully generator, fitted with a three-way valve A, which enables the operator to pass the water gas

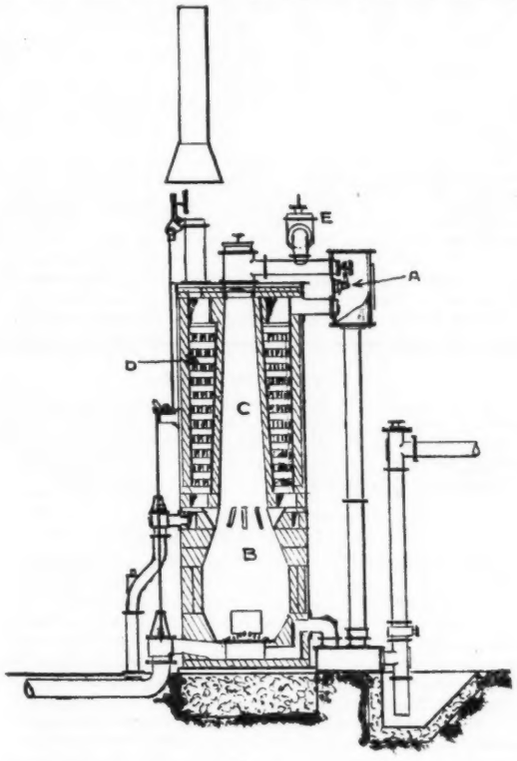


Fig. 1.

generated in B either through the retort C or chequered work D. By working through the retort, an increased yield of low-temperature tar is obtained up to 16 gallons per ton, which, at 6d. per gallon, represents 8s. per ton of coal.

Under suitable conditions, about 200 therms of 340 to 350 B.Th.U. per c.ft. gas is obtained per ton of coal by this method. If a higher calorific value—350 to 375 B.Th.U.—is desired, this can secured by passing the gas through the chequer work, but the yield of tar is correspondingly reduced.

The sensible heat of the water gas passed through the retort supplies nearly 50 p.ct. of the heat required to carbonize the coal. The tar is of excellent quality, and is practically free from pitch or lamp black. When working down the retort, it is necessary to admit steam at the nostrils, to avoid over-cracking.

The improvements in this type of plant are principally:

(1) In the position and size of the nostrils.

(2) A new type of grate, which delivers the blast and steam to the centre of the fuel bed, thereby reducing the formation of clinker and facilitating its removal.

(3) A further economy can be obtained by a by-pass E, which enables the operator to pass rich gas from the retort to the coal-gas foul main during the blow period, or when the plant is damped down.

TYPE NO. 2.

The addition of the carburettor enables the quality of the gas to be maintained within very fine limits, and, if desired, a higher quality of gas can be obtained by the addition of oil than is given

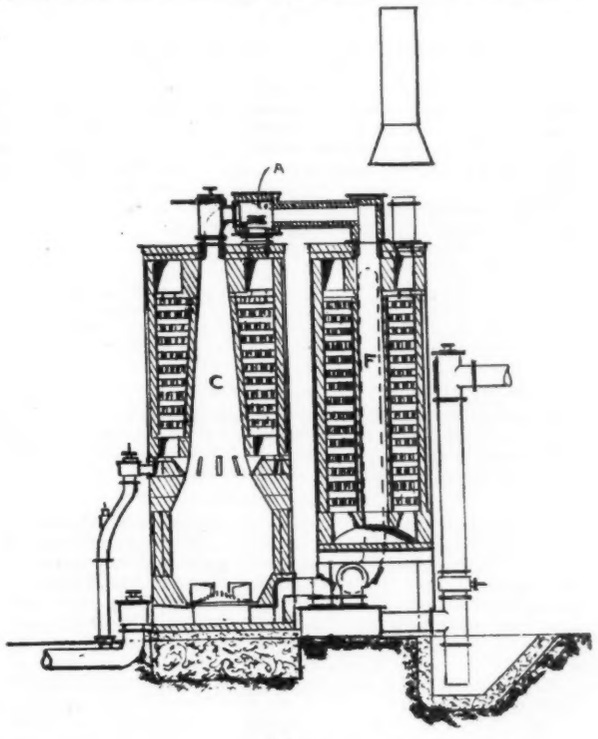


Fig. 2.

by coal alone. A further advantage of the carburettor lies in the fact that it acts as a fixing chamber for the light oils and hydrocarbons, thereby making a stable gas.

The yield from this type is about 200 therms of 370 to 380 B.Th.U. gas per ton of coal, which can be brought up to 420 B.Th.U. by the addition of 0·3 gallon of oil. To effect this with an ordinary carburetted water-gas plant using coke would re-

quire (according to Mr. Evetts) about 1·4 gallons of oil, which, at 6d. per gallon, would represent a large saving in favour of the Tully plant. There would, in addition, be about 6 gallons of tar, which means a credit of 3s. per ton against the cost of the coal.

The composition of the gas, which is about one-third coal gas and two-thirds water gas, with a natural enrichment of about 1 gallon per 1000 c.ft., is superior to ordinary carburetted water gas, due to its lower percentage of inerts and its higher methane content. It is owing to these features that Tully gas is such a suitable gas for diluting rich coal gas—in fact, it is unequalled for this purpose by any gas yet produced.

TYPE NO. 3.

This type consists of a twin retort plant, which is blown for 2 minutes in parallel, and alternately steamed in series for 2½ minutes, first through one retort and then through the other, as shown in the diagram—making a cycle of 7 minutes. The object of this type is to give the gas a longer time-contact with the hot chequer work, which results in the fixing of the lighter hydrocarbons, and gives the gas greater carrying power.

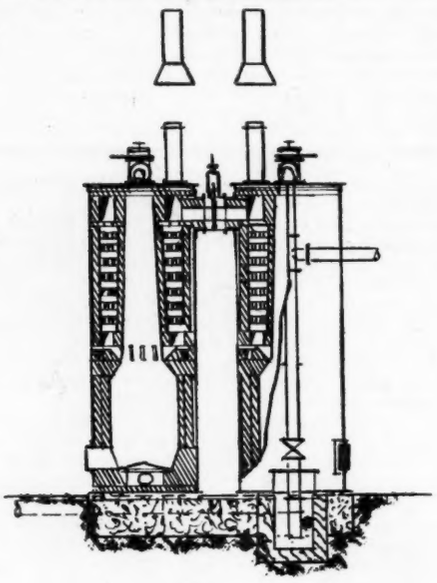


Fig. 3.

The apparatus is simple to operate, and produces a gas of uniform quality. The plants are now fitted with pyrometers and steam meters, which enable a check to be kept on their efficient working. Oil can be used for carburetting, if desired, and either plant can be operated independently. A plant of this type produces all the gas required for running the works at Newark, which comprise gas-engines, welding furnaces, annealing, heating, lighting, &c.

The apparatus can be started from cold in two hours. The gas produced is of the following composition:

			B.Th.U.
CO_2	3·2		
O_2	0·2		
C_nH_m	0·8	× 2300 ÷ 100 =	18·40
CO	33·4	× 321 ÷ 100 =	107·21
CH_4	14·35	× 1023 ÷ 100 =	146·80
H_2	37·81	× 321 ÷ 100 =	121·37
N_2	10·24		
	100·00		393·78

A gas similar to the above, of approximately 400 B.Th.U., is being supplied direct to the district, and is proving eminently satisfactory in every way. Demonstrations or tests can be made on this plant by any engineer who is interested.

CHEAP THERMS.

The Tully plant is a money-making proposition; it enables the gas manager to run his coal-gas installation at its maximum efficiency. He can control his coke market, and need only make sufficient coke to supply his own customers at good prices, without the necessity of dumping it at a loss and interfering with other markets. The quality of the coke, when working at moderate temperatures, owing to its higher volatile content, will command a local market at top prices.

It is an established fact that the Tully plant is producing the cheapest therm. One ton of good coal will give about 198 therms of (approx.) 360 B.Th.U. gas, and about 12 gallons of tar. If this gas is mixed with a rich coal gas of 600 B.Th.U. in the proportion of one volume of coal gas to two volumes of Tully gas, mixed gas of 440 B.Th.U. is obtained. A mixture of 55,000 c.ft. of coal gas of 600 B.Th.U. with 110,000 c.ft. of 360 B.Th.U. Tully gas gives from 7½ tons of coal 165,000 c.ft. of 440 B.Th.U. gas, or 22,000 c.ft. per ton, or 96·8 therms of mixed gas per ton, about 9 cwt. of excellent coke, and 12 gallons of tar per ton.

As against this, suppose the make of coal gas is stretched to 12,000 c.ft. of 500 B.Th.U. gas, only the same amount of therms is obtained—viz., 60. Obviously there is no advantage in stretching the make from the therm point of view; in fact, from an economic standpoint, everything is in favour of making a good 600 B.Th.U. gas, for the following reasons:

1.—Lower temperatures are required for carbonizing, with less fuel consumption.
2.—Less wear and tear on the retorts and settings.
3.—No stopped pipes or pitched-up hydraulics.
4.—No naphthalene troubles.
5.—A better tar and superior coke.
6.—A better all-round gas, low in inerts.

These are the lines on which to manufacture cheap therms and a gas that will give better all-round satisfaction to the consumer than straight coal gas.

SCOTTISH JUNIOR GAS ASSOCIATION.

(EASTERN DISTRICT.)

Visit to the Dundee Tar Distillation Works.

On Saturday, Jan. 12, the members of the Eastern District of the Scottish Junior Gas Association were privileged to carry through an interesting programme in the city of Dundee.

The central point of interest and attraction was the tour of the tar distillation works of the Dundee Gas Commissioners. The visitors were received by Mr. L. R. Hislop, the Assistant Engineer and Manager of the Gas Department; Councillor J. S. Brown, Convener of the Gas Committee; and Mr. Sam Donald, Superintendent of the tar distillation works. The different processes were demonstrated and explained, though, unfortunately, part of the plant was under repair. Subsequently the adjacent electricity station was visited, and an instructive tour made of the various departments. Interest was aroused in a new wagon-tippler operated electrically. The whole operation is not only expeditious, but highly ingenious. By the courtesy of Mr. Bishop (the Electrical Engineer) and his assistants, ample facilities were granted for the examination of the plant.

At the close of the tour of inspection the visitors were conveyed by motor to Dundee, where an adjournment was made to Lamb's Restaurant, in Reform Street. Here the Dundee Gas Commissioners proved hospitable hosts.

Councillor J. S. BROWN, the Gas Convener, who presided, said he was delighted to see such a splendid turn-out of the members of the Eastern District of the Scottish Junior Gas Association. It was unfortunate that repairs were being carried out at the tar distillation works; but, despite this disadvantage, he felt that what they had seen had impressed them all.

Mr. BRUCE, the President, said that the thanks of all the members were due to those gentlemen in the various departments of municipal life in Dundee who had made the round of sightseeing so enjoyable and instructive. It had been a highly educative afternoon for all, and they were grateful to the guides and conductors, who had not hesitated to supply the fullest information.

Mr. L. R. HISLOP, the Assistant Engineer and Manager of the Dundee Gas Department, remarked that it had been a pleasure for himself and his colleagues to show the members over the tar distillation works. It was to be regretted that an unfortunate breakdown had taken place just prior to the visit. However, if any of the visitors had occasion to be in Dundee in the near future, they should endeavour to renew their acquaintance with the works. The processes would be fully explained to them, and every facility provided for imparting full information.

Translation Service.

The "JOURNAL" is in a favourable position to give prompt attention to fuller translations, especially from the French or German, of any abstracts which appear from time to time in its columns, or to deal with any other such work which its readers may require. Quotations may be had on application.

A New Co-Partners' Magazine.

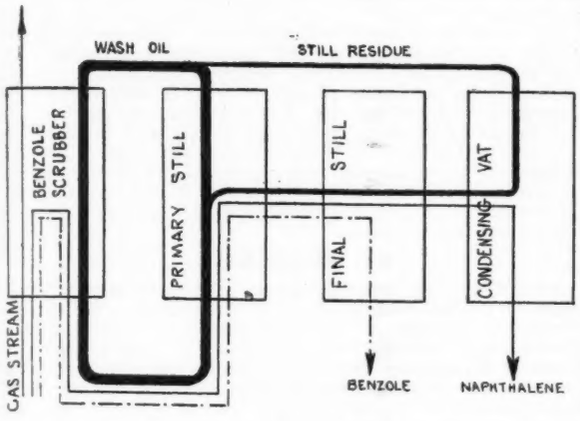
A hearty welcome is extended to the latest addition to the number of gas companies' co-partnership publications—the "Co-Partners' Magazine" of the Liverpool Gas Company. The first issue of this new "house organ" gives promise of a highly successful career, which we sincerely hope will be realized to the full. It is accompanied by a portrait of the Chairman of the Company (Mr. H. Wade Deacon, C.B.E., J.P.), who, in a brief message wishing success to the venture, says that "to encourage and to foster the co-partnership ideal in the Liverpool Gas Company, this magazine has been founded in faith and enthusiasm by those who believe in it." The Engineer (Mr. R. E. Gibson), the Treasurer (Mr. Edwin Upton), and the Secretary and Law Clerk (Mr. Theodore Garnett) also greet fellow-partners in the service of the Company. Among the items of interest in this first number is an announcement that the Directors have decided to increase the co-partnership bonus by 1 p.ct. for the half-year June-December, 1923—viz., from 3 p.ct. to 4 p.ct. on the pre-war standard rate of pay. This is a temporary arrangement, and the bonus will further increase by ¼ p.ct. for every 0·2d. per therm decrease in the present price of gas, which is 7·4d. per therm.

BENZOLE EXTRACTION AND NAPHTHALENE.

Solubility and Vapour Pressure of the Naphthalene.

Although benzole extraction in connection with gas-works practice is not of the same importance in England to-day as it is in Germany, we have thought that the following work will be of interest to many of our readers, and that it will stand as a valuable work of reference. It is the report of no less an authority than Prof. Dr. K. Bunte on researches made, with H. Pippig as collaborator, at the Experimental Institute at Karlsruhe, and was published in "Das Gas- und Wasserfach."

The broad principles of the ideal benzole recovery plant are shown, they say, merely in rough plan form, in the accompanying diagram. The gas stream, laden with benzole and naphthalene, is met by a certain wash oil, which circulates in a set course (scrubber—primary steam still—scrubber). In the scrubber, the oil takes from the gas benzole and its homologues, and also naphthalene, and in the primary still these are again given up as a



crude product through the application of direct steam. The wash oil, now free of benzole and naphthalene, is pumped back to the scrubber, and the process repeated. The crude product is passed on to the distilling plant, where, generally by an indirect steaming process, the benzole and its immediate homologues are distilled off. There remain the higher homologues of the benzole, together with lower-boiling fractions of the wash oil, and naphthalene. This residue is treated in a cooling vat, where as much of the naphthalene as possible is removed, and the rest returned to the wash oil for further use. (Circuit *b* in the diagram.)

In actual practice these processes, especially as regards the naphthalene, do not work quite so smoothly. In order, therefore, to probe the physical principles involved, and to find out all possible about the naphthalene separation, these investigations were carried out concerning the solubility of the naphthalene and its vapour pressure in solution in the wash oil and in the intermediate products.

Determination of Solubility.

First the solubility of the naphthalene was determined—

1. In fresh wash oil.
2. In oil after treatment in the primary still.
3. In the final still residue at 0°, 10°, 20°, 30°, and 40° C.

The solubility tests comprise two main processes—first, the saturation of the oil at a certain temperature; and, secondly, the determination of the naphthalene contents in the oil. In the saturation of an oil with naphthalene, it was found that reliable determinations of solubility can be made only by a gradual saturation of the oil, warming it slowly in contact with the naphthalene, until the desired saturation temperature is attained. Working the other way—by cooling the solution and filtering off from the naphthalene which separates out—may easily lead to supersaturated solutions, owing to obstinacy in crystallization.

The determination of the naphthalene in the saturated oils was carried out according to the general principles of Mezger and Glaser's method, but with slight modifications, which were found advisable, and which are detailed in the text.

Vapour Pressure.

The pressure of naphthalene in solution in the wash oil and the intermediate products was next investigated. The usual statical method, by means of a tensiometer, could not be used in this case, as Schlumberger, in his researches on tensions of pure naphthalene, has shown that vapour pressures of the naphthalene have to be reckoned with even at temperatures between 0° and 40° C., which in extreme cases may even amount to 0·006 to 0·320 mm. of mercury. Accordingly a method was devised—which is fully described and illustrated in the text—by which a stream of gas, free from naphthalene, was passed through the naphthalene and oil mixture, in which it became saturated to a degree corresponding with the vapour pressure of the naphthalene in the oil. It was then passed through picric acid, and its volume afterwards measured. In this process it was necessary, of course, to bring the gas stream into such intimate contact with the oil as to allow of its becoming completely saturated, and to use such quantity of oil as to render practically negligible the diminution in concentration of the naphthalene in the oil caused by the passage of the gas stream. For the experiments, concentrations were not chosen at random, but the oils used were saturated at 0° C. and 20° C. respectively.

The Results.

The following table gives a description of the oils which were used. Apparently, two distinct samples from the primary still were used.

—	Fresh Wash Oil.	Steam Distilled Oil. No. I.	Final Still Residue.	Steam Distilled Oil. No. II.
Mean molecular weight .	140 8	209·3	80·29	150·0
Naphthalene	14·93 p.ct.	6·98 p.ct.	12·66 p.ct.	4·0 p.ct.
Acid constituents . . .	3 5 ,,	2·80 ,,	2·25 ,,	6·25 ,,
Basic do. . . .	3·88 ,,	2·14 ,,	1·00 ,,	3·50 ,,
Fractional analysis—				
140° C.	..	..	..	1·0
150°	..	..	..	..
160°	..	..	1·0	0·5
170°	..	..	2·5	..
180°	..	..	4·5	..
190°	..	..	6·0	0·5
200°	8·0	4·0	14·0	0 5
210°	3·0	1·0	17·0	1·5
220°	5·0	7·0	15·0	1·0
230°	14·0	6·0	14·0	5·0
240°	13·0	7·5	9·0	4·0
250°	15·0	12·5	13·0	16·0
260°	7·0	12·5	4·0	7·0
270°	3·0	8·0	..	14·0
280°	5·0	5·0	..	6·0
290°	5·0	2·5	..	8·0
300°	3·0	4·0	..	10 0
310°	9·0	25·0	..	5·0
320°	1·0	2·5	..	3·0
330°	2·0	1·5	..	2·0
340°	1·0	..	..	..
350°	2·0	..	..	..
P.ct. . . .	96·0	99·0	100·0	85·0

The results of the solubility tests are as follows:

Temperature.	Solubility of Naphthalene in		
	Fresh Oil.	Steam Distilled Oil No. 1.	Final Still Residue.
°C.	P.Ct.	P.Ct.	P.Ct.
0	10·20	7·50	13·77
10	13·98	11·50	14·50
20	17·06	17 50	15 50
30	21·40	25 99	22·48
40	30·12	35·29	32·12

The vapour pressure in steam-distilled oil No. II. was next determined at 20° C. and at increasing degrees of naphthalene concentration. The following values are given:

Tension.

Naphthalene. P.Ct.		Grammes Per 100 Cub.M.
4	..	2·799
5	..	3·834
6	..	4·240
7	..	4·530
9	..	5·290
10	..	5·800
11	..	6·990
12	..	7·850
13	..	8·500
14	..	9·150

The vapour pressures of naphthalene in the various oils saturated at 0° and 20° C. are given in the following table in mm. of mercury and grammes per 100 cub. m.:

Temperature.	Saturated at 0° C.		Saturated at 20° C.	
	Grammes per 100 Cub.M.	Mm/Hg.	Grammes per 100 Cub.M.	Mm/Hg.
	In Fresh Wash Oil.			
0° C.	3·50	0·00460	4·50	0·00600
10°	5·50	0·00725	14·20	0 02100
20°	7·60	0 00998	9·50	0·01034
25°	—	—	9·345	0·01190
30°	9 24	0 01210	11·15	0·01456
40°	11·20	0 01461	21·40	0·02743
	After Treatment in Primary Still.			
0°	3·60	0·00500	4·50	0·00600
10°	9·44	0 01235	14·48	0·01880
20°	29·97	0·03384	36·45	0·04558
25°	—	—	45·20	0·05569
30°	52·44	0·06390	59·75	0·07196
40°	116·80	0·12900	130·20	0 14210
	Final Still Residue.			
0°	1·600	0·00212	4·500	0·00600
10°	1·750	0·00232	15·200	0·02120
20°	6·456	0·00850	7·975	0·01047
30°	6·765	0·0089	8·899	0·01165
40°	8·468	0·01110	9·668	0·01255

SUMMARY OF FINDINGS.

The authors summarize their findings under four headings:

1. The solubility of solid naphthalene in wash oil at the various stages of the benzole extraction process—viz., in its original state, after primary steam distillation, and as residue from the final still—varies very little.
2. The vapour pressure of naphthalene in oil from the primary still, when it has been in circulation in the process for some time, is very high in comparison with the fresh original oil and the final still residue.
3. With saturated oils there is always a danger of solid naphthalene separating out on the walls of the scrubber, as a result of which the vapour pressure of pure naphthalene is reached.
4. In technical literature, two curves are to be found for the vapour pressure of pure naphthalene—one by Allen, and the other by Schlumberger—which agree only at temperatures above 50° C. With a view to testing their own method, devised for the purpose of these investigations, the authors carried out a test experiment at 20° C., finding a value of 0·0545 mm. of mercury, thus confirming Schlumberger's 0·0540 (against Allen's 0·0800).

AMERICAN GAS ASSOCIATION.

Some Notes from the Papers and Reports.

(*Concluded from p.* 86.)

Experiences with the Therm in England.

Readers may be reminded that Dr. E. W. Smith, F.I.C., visited America and lectured at the convention on the topical subject of "Experience with the Therm in England. This lecture was reproduced *in extenso* in the number of the "JOURNAL" for Oct. 24 last (pp. 252-55).

Deposits in Gas Pipes and Meters.

The previous year's report of the Deposits Committee dealt exclusively with the study they had made of gummy and resinous deposits in pipes and meters; it being stated then that the gummy deposits were due fundamentally to the unsaturated hydrocarbons of the gas. They reported the identification and the measurement of the particular chemical compounds that were gum-forming, and which were responsible for gum formation in pipes and meters, and referred in detail to the principal compounds—indene and styrane. It was pointed out that the gummy deposits were largely formed from these compounds, through polymerization, autoxidation, and other chemical action, and that the oxygen in the gas played an important part in gum formation. Attention was also drawn to many other smaller factors.

Introducing their 1923 report, the Committee (whose Chairman is Mr. Ralph L. Brown, of the United States Bureau of Mines) remarked that the formation of gummy deposits by any gas is dependent primarily on the quantity and composition of the light oil it carries. The latter has its pyrogenetic origin in the gas oil used and in the chemical and physical changes effected in it in the carburetting process. Control of the quantity and composition of the light oil carried by the gas into distributing systems is vested in three major factors: First, the oil used in carburetting the blue gas; secondly, the process of carburetting; and, thirdly, the purification processes (including cooling, condensing, and the removal of tar and other impurities from the gas). The oxygen content in the gas makes a fourth factor. The programme of work for last year was based on these four factors, and the material ready for presentation was included in the report, under these heads:

(1) The relation of the character of the gas oil to the composition and gum-forming constituents of the light oil of the resultant gas. (2) Light oil composition as found in carburetted water gas. (3) A report on the actual oxygen consumption by purifier boxes, where revivification *in situ* is carried on.

In the first place, three gas oils in common use were cracked in an atmosphere of blue gas, and it was found that with different oils the resultant light oils varied in amount, in composition, in total unsaturation, in the degree of unsaturation of the principal gum-forming fractions, and, finally, in the relative magnitudes of the indene fractions and in the indene contents of those fractions based on a unit volume of gas oil cracked. There was also a variation in values throughout with changes in temperature. The light oil diminished, and the oil gas volume increased, with rise of cracking temperature above 1350° Fahr. It can, in the opinion of the Committee, now be no longer doubted that the character of the gas oil bears a direct relationship to the amount of gum-forming constituents in the resultant gas; and it is further evident that the cracking temperature is a very important factor in the quantity of gum-forming constituents in carburetted water gas. The importance of careful and correct operation of carburetting plant can hardly be over-emphasized.

The presence of oxygen in the gas is certain where revivification *in situ* is employed, as is the case at the present time; but in the previous year's report it was pointed out that the oxygen content averaged 0·8 p.ct. or more, and that, since the calculated theoretical requirements for a gas containing 100 grains of H_2S was less than 0·1 p.ct. of oxygen, the oxygen being added was theoretically some eight to ten times that necessary. It was thought desirable to determine the practical working consumption of oxygen in purifier boxes, and therefore a Sub-Committee drawn from the Purification and Deposits Committees (with Dr. J. F. Wing as Chairman) was appointed for the purpose. Tests from five sources have been reported by the Committee; and these (though admittedly not at all conclusive) all indicate that, under the conditions existing at the time, considerably less air would have served the purpose, and less surplus oxygen would have passed on.

Relations with Customers.

The Committee having this subject in hand reported their belief that the gas industry as a whole is to be congratulated on the progress that has been made in establishing better relations with customers. Within the last decade there has come about, partly through the ownership of stock by public utility customers, a change in the attitude of the average person towards big business in general, and towards such indispensable service as the public utility undertakings provide. Gas companies all over the country, who have been continually keeping the service idea before the public, are deserving of a full measure of credit for the gradual improvement in relations with customers. Consumers are becoming more discriminating, and consequently complaints are less wholesale, and less unjust. Relations with customers will, like everything else in the industry, improve in proportion to the attention given to the subject. There is no ill in the gas business that cannot be cured by right thinking and hard work. The present is packed with possibilities. Safety, self-preservation, and progress lie in a coherent programme. If the programme includes careful guarding of every point of contact with customers, the reward will be a rich harvest of goodwill. Goodwill is inseparably linked with progress.

High Bill Complaints.

A Sub-Committee of the Committee just referred to considered, under the Chairmanship of Mr. G. M. Hergesheimer, the subject of high bill complaints. While, they said, the treatment of high bill complaints is to-day being recognized as a most important branch of the business, and consequently is beginning to receive the full attention which it deserves, energies must not be solely devoted to cure, to the overlooking of another aspect of the question, of equal importance—namely, prevention. This must be considered. How much better would it be if high bill complaints could be prevented, rather than undertake the building-up of an efficient staff for their cure. This cure, of course, can never be wholly accomplished; but it is possible, by slow, painstaking endeavour, to accomplish it in part.

The way to do it is to teach faith in the gas-meter, and continually to encourage customers to read their meters periodically and keep a record of the gas consumption daily or weekly, as they would do in the case of any other purchasable commodity. To further this, cards should be printed, explaining their purpose in an interesting way, and including a drawing of the meter dials, with instructions for reading the meter. The back of the card should be ruled to permit entry of date, index, and amount of gas consumed. The results from such a method will be slow, but by constant education and encouragement, the step will be productive of much good.

Residence Gas Heating.

During the winter of 1922-23, the Denver Gas and Electric Light Company inaugurated an experimental programme of residence heating with gas; and the conditions, methods adopted, experiences, and economic results obtained formed the subject of a paper by Mr. T. M. Foulk and Mr. T. G. Storey (respectively the Company's Engineer of Utilization and Superintendent of the House Heating Division). Denver is situated in the heart of Colorado's lignite beds, from which is available an abundant supply of comparatively cheap fuel. It also has extraordinary temperature conditions; the average temperature during the heating season being low, and subject to wide variations and sudden changes. Thus a fuel that readily lends itself to meet such conditions possesses decided advantages. The Company are successfully utilizing a gas of 400 B.Th.U. The charge is made up of a three-part rate—a customer charge, a maximum hourly demand per annum charge, and a consumption charge. The maximum hourly demand is determined by actual test after the installation has been completed.

The installations comprise three main classes—gas-fired hot-air furnaces, coal-fired boilers converted to burn gas, and boilers designed for gas. Equipment for the average conversion amounts to about $65. The first cost of a gas-fired boiler is little more than that of an equivalent coal-fired boiler, and the cost of installation is very low. The majority of installations are thermostatically controlled, and such control is strongly urged. A summary of house-heating data comprising 36 representative installations of the three kinds just mentioned, for the season 1922-23, shows that the cost of heating with gas averaged $1·56 per million B.Th.U. input, while the cost of heating with coal was 50 c. per million B.Th.U. input. However, when placed on the same basis of actual heat utilized, the cost of coal replacing a million B.Th.U. of gas averaged 95 c. for hot-air furnaces, 84 c. for conversions, and 81 c. for gas-boilers—or a general average of 89 c. for coal, against $1·56 for gas. In calculating the heating costs with coal, no charges for removal of ashes or for janitor service have been considered. In some cases, where a fireman was employed,

the actual cash cost of heating the home, per season, with gas has been very close to the costs with coal. There are a number of intangible savings resulting from the use of gas, which can be properly considered—such as cleanliness, economy of space, ease of control, and constant temperature, with resultant better health conditions. It is estimated that, in the coldest period of a severe winter, the house heating appliances will average twenty hours' daily operation.

Capital Records.

Another of the reports submitted was that of the Committee on Fixed Capital Records, whose Chairman was Mr. H. J. La Wall, of the United Gas Improvement Company. In 1921, the Committee made a canvass of the larger companies, to ascertain the method in use for keeping detailed construction records, and to learn the attitude of these companies towards maintaining a continuous inventory of fixed capital; and in the following year the Committee made a further study of the advantages of maintaining a continuous inventory, and presented a general outline for installing a workable system. For 1923, the following programme was decided upon: (1) To procure descriptions of several systems of keeping fixed capital records in use by some of the companies, together with all forms used in connection therewith; (2) to make a complete list of the so-called indirect or undistributed items of cost, prepare a discussion of these items and their relation to fixed capital, and recommend a method of distributing these elements of cost to individual projects, in order that they may become a part of the fixed capital; and (3) to design a model system of fixed capital records, with forms, together with a complete description of their use and instructions for maintaining such a system. This work was completed, and the report presented included a description of a system of fixed capital records now in use by the St. Paul (Minn.) Gas Light Company, a discussion of indirect or undistributed items of cost, a proposed system of fixed capital records with forms, and supplementary fixed capital record forms. The Committee confined their consideration to the so called overhead, general, indirect, or undistributed items of cost of the "tangible property," defined to include "such overhead expenditure for engineering, taxes during construction, &c., as can be allocated to definite items of property." Heretofore, they said, these items have not generally been given proper consideration by many of the public utility undertakings, in the matter of charging the proper proportion to capital. Proposed methods for keeping fixed capital records included in the report do not embody the perfect system that the Committee would have liked to see incorporated; but the perfecting of the system in the time at disposal was found to be a physical impossibility. Besides, it was felt that no system could be devised to meet all the requirements of every company, and that the ultimate method will have to be modified to meet individual cases.

The section on indirect or undistributed items of cost was by Mr. A. C. Klein, of Messrs. Stone and Webster, Boston, and Mr. C. A. Schlegel, of the United Gas Improvement Company, Philadelphia, who remarked that during the period of initial construction of an industrial enterprise, before operations have been commenced, the inclusion in the capital accounts of the total cost of the property is a simple matter. After this period, however, when plant operations and extensions are going on simultaneously, the classification of costs between operating expenses and construction—particularly the indirect items which may be applicable in part to both—becomes more difficult. In a public utility, where the price of the product is based upon operating expenses, *plus* a return on the property devoted to the service of its customers, it is most important that expenditures incurred for operation and for construction be properly segregated. While large companies may have separate construction departments, in the smaller companies the same employees may devote part of their time to operation and part to construction, making it difficult properly to separate construction cost from operating cost. The writers believe that it has been the tendency for public utility undertakings, in many cases, to charge too small a proportion of such expenditure to capital, and too large a proportion to operation—due in part to the difficulties of making accurate distribution, and in part to the fact that such employees are usually engaged primarily on operating activities. This has the effect of burdening present consumers with expense incurred for the benefit of future ones. The principal elements of fixed capital which are affected by this practice, and which are consequently too low, are the elements which are variously termed "general," "indirect," or "undistributed" costs.

Greatest Heating Value at the Lowest Price.

The benefits of an extended use of cheaper gas service will never be enjoyed by the American public so long as arbitrary and unnecessary standards and limitations imposed upon the gas undertakings force them to go far afield for special coals when there is an abundance of available fuel near at hand, declared Mr. O. P. Hood, Chief Mechanical Engineer of the United States Bureau of Mines. Pleading for more rational and liberal laws, which would leave the gas manufacturer free to declare a standard for gas which would enable him to use a fuel convenient to his district, Mr. Hood said the immediate results would be a greater usefulness of gas, a lower cost of production, a more stable supply of fuel, and a better use of the country's transportation systems. At present coals from distant fields are hauled across and beyond other coalfields. The reason for this is that the technical, commercial, and legal limitations compel the gas man to use a very special fuel, though usable gas could be made from almost any fuel. In so far as available processes limit him to such special fuels, extra long transport may be justified; but the development and use of better processes is being retarded by a confusion of standards of gas that take no account of the most available fuel.

Mr. Hood went on to say that the fundamental problem before the industry should be that of furnishing the greatest heating value in the form of gas at the lowest possible price per heat unit consistent with good business. The public has gained the impression that this has not always been the aim of gas companies. Ears are therefore dulled to those technical arguments that would induce a lowering of the B.Th.U. standard. This is unfortunate, because the maintenance of existing standards may be directly opposed to the public interest. Uniformity of quality and proper adjustment of apparatus are much more important to the consumer than a high heating value standard. When each coal field shall satisfy the needs of a region naturally tributary to it, with a minimum of transportation charges, an ideal condition will have been reached. It should be the aim of technical processes, community habits, and legal enactments to bring about this condition.

Washing Clinker.

In No. 48, 1923, of "Das Gas- und Wasserfach," Herr G. Hasse describes a clinker washery, by the Méguin Company, of Butzbach, which he has installed in the Wandsbek Gas-Works. The plant, which is small enough to be installed in a corner of the retort-house, can deal with about 90 c.ft. of clinker per hour, from which the fine ash has previously been screened. By a stream of water pumped upwards through the clinker, the specifically lighter coke is separated from the heavier clinker, the former passing automatically out of the machine, to be drained on a suitable grid before removal in trolleys. The remaining clinker is likewise drained. All the water used is filtered and circulated in the system again and again; the only loss—a very small and practically negligible one—being that which is permanently absorbed by the material. Of the clinker treated, tests show that 20 p.ct. is rejected as fine ash before the process, 24·8 p.ct. in pieces of 7 to 80 mm. by the washing, and 48·7 p.ct. recovered as coke; the balance being accounted for by the water absorbed. For dealing with a ton of material in 30 minutes, about 0·265 KW.-hour is required. Three men manipulate the whole process, including the feeding and removal of the clinker. The results have proved highly profitable.

Spontaneous Combustion of Coal.

Dealing, in a contribution by the Fuels Division to the proceedings of the American Society of Mechanical Engineers, with the spontaneous combustion of coal, Mr. O. P. Hood, Chief Mechanical Engineer to the United States Bureau of Mines, points out that a particle of coal within the mine has for its immediate neighbour a similar particle with which it has exchanged molecules, perhaps, and suffered common losses, until further reaction has practically stopped. This particle, removed from the mine, is surrounded by air, from which it had been shielded for ages, and its moisture, temperature, and environment become different. When mined, it is the freshly broken coal surface that experiences the greatest change, and finds its equilibrium most seriously upset. One can therefore expect it to be chemically active, in some way seeking to establish equilibrium under new conditions. It will be rapid at first, and then slow down. These changes may develop heat. The rate of the chemical re-adjustments is greatly increased with increase of temperature; and as the temperature rises new reactions also become possible, involving other constituents of the coal substance. Mr. J. D. Davis, of the Bureau, has devised an adiabatic calorimeter which provides an environment for coal that follows exactly the momentary temperature of the coal. Fine coal through which oxygen of the same temperature is made to flow rises gradually in temperature from 150° Fahr. until a critical point is reached, when the temperature rise is greatly accelerated. This critical point varies for different coals, but is about 185° Fahr. When a coal surface is elevated in temperature above that of its surroundings, it will lose heat by conduction, radiation, and convection. The body of the piece will itself be heated by conduction. If there is a considerable movement of air, any heat generated is carried away. There is therefore some rate of air movement too slow to carry heat away, but sufficient to maintain the supply of oxygen and produce the maximum heating effect. The problem of coal storage is to prevent this condition, or, if it exists, to discover and remedy it before a critical temperature is reached. A conical pile of run-of-mine coal made by dumping from one point will have a central core of small-sized particles, air exchange through which will be exceedingly slow. With such handling, coal sizes are classified; and the hazard is greatly increased by allowing this classifying action in building the pile. A dry pile which may be sufficiently ventilated may be partially sealed if wet, and reduce the ventilation to a dangerous point. Putting water on a hot part of a pile merely seems to furnish a good carrier of heat to other parts of the pile, and to disturb ventilation, unless large quantities are used, and the pile drenched; and even then it is possible to have the under-part of a large piece of coal glowing, while a heavy stream of water is shed from the top. The possibility of quick removal should be considered in storing coal.

A CHEMIST ON WORKS PRACTICE.

By ROBERT STURROCK, of Glasgow.

[Extracted from a Paper read before the Scottish Junior Gas Association (Western District) on Jan. 12, 1924.]

(*Concluded from p.* 149.)

THE ACID WASHER.

This part of the wet purification plant is situated at the outlet of the scrubbers, its function being to prevent the loss of any ammonia in case of any deficiency on the part of the washers or scrubbers. A 1½-in. pipe, however, is placed between the inlet and outlet mains of the washer, to permit of a little ammonia passing to the purifiers. The washer consists of an enclosed chamber through which the gas passes, and an outer chamber; both being lead lined. A weak solution of H_2SO_4 is constantly circulated from the outer chamber through the enclosed portion, from which it again overflows to the outer. This constant circulation is accomplished by means of compressed air from a small reciprocating air pump. When necessary, a little more H_2SO_4 and water is added; and this process is carried on till the mother liquor reaches 43° Tw. It is then transferred to the saturator well of the Chemical Department's sulphate plant.

I am obliged to Mr. W. A. Walmsley, Manager of the Chemical Works Department, for the following data recently obtained on the plant:

3700 gallons of gas liquor used per ton of sulphate of ammonia produced, containing 1·40 p.ct. free, and 0·10 p.ct. fixed ammonia.
19 cwt. of fine breeze equivalent to steam used per ton of sulphate produced.
¼ cwt. of lime used per ton of sulphate produced.
18·5 cwt. of H_2SO_4 of 144° Tw. used per ton of sulphate produced.

The analysis of the dry neutral sulphate thus produced is as follows:

	P.Ct.
Moisture	0·05
Free acid	0·01
Ash	0·20
Other impurities	0·20
Sulphate	99·54
	100·00

Ammonia = 25 54 p.ct.

The type of vertical retort used at Dalmarnock appears to adapt itself to increased steaming; and since the test, very much higher yields of neutral sulphate have been obtained, an average figure being 45 lbs. per ton of coal carbonized. The percentage ammonia in the gas liquor varies from 1·5 to 1·7 p.ct.; and, on an average, 50 gallons of 10-oz. liquor are obtained per ton of coal carbonized.

An average coke production per ton of coal is 13·8 cwt., which is divided up thus:

Riddled coke	9·1 cwt. per ton
Riddled breeze	1·9 ,, ,,
Fine breeze	2·8 ,, ,,

TAR.

The following is a result of analysis of the tar produced at Dalmarnock.

Sp. gr. 1·080.
Amount distilled, 1 gallon.

—	P.Ct. by Weight.	Gallons per Ton.
NH_3 water at 9·15 oz. str.	3·19	7·0
Crude benzole. Sp. gr. 0·910	2·40	5·9
Light oil. Sp. gr. 0 968	5 23	12·1
Light creosote. Sp. gr. 0·986	14·32	32·5
Heavy creosote. Sp. gr. 1·020	26·65	58·5
Pitch, of 118° Fahr. twist point	48·21	1080·5 lbs.

Finished Products Per Ton.

—	P.Ct. by Weight.	Gallons per Ton.
Ammonia water at 9·15 oz. str.	3·19	7·0
90's Benzole	0·23	0·6
90's Toluole	0·15	0·4
90's Solvent naphtha	0·66	1·7
Heavy naphtha	0·46	1·3
Tar acids	8·56	18·4
Crude pyridine	0·23	0·5
Total creosote	38·31	86·1
Pitch, of 118° Fahr. twist point	48·21	1080·5 lbs.

The following is an analysis of Dalmarnock coke (dry basis).

—	Riddled Coke.	Riddled Breeze.	Fine Breeze.
	P.Ct.	P.Ct.	P.Ct.
Volatile matter	3·2	5·8	6·0
Fixed carbon	83·5	81·5	75·5
Ash	13·3	14·8	18·5
	100·0	100·0	100·0
Moisture	13·08 p.ct.	10·30 p.ct.	21·46 p.ct.
Calorific value in B.Th.U. per lb.	13,500	13,000	11,800

SUMMARY OF RESULTS AT DALMARNOCK.

The following figures have been obtained in actual practice in the past six months:

Therms produced per ton of coal	67·5
C.ft. of gas made per ton of coal	13,831
Calorific value of gas in B.Th.U. per c.ft.	488
Tar produced per ton of coal	14·6 gallons
10 oz. liquor ,, ,, ,,	48·9 ,,
Strength of liquor produced	1·76 p.ct. NH_3 = 8·11 oz. str.

Analysis of gas made—

	P.Ct.
CO_2	8·15
C_nH_m	2·41
O_2	0·38
CO	12·68
CH_4	21·14
H_2	48·98
N_2	6·26

SMOKELESS FUEL.

The Glasgow Corporation have adopted the "Maclaurin" low-temperature carbonization process; and, through the courtesy of Mr. Robert Maclaurin, the patentee of the process, and Mr. John W. M'Lusky, the General Manager of the Glasgow Corporation Gas Department, I am in a position to give details of it.

In December, 1921, the Glasgow Corporation Gas Department had representatives at Grangemouth, who carried out a four days' test on the Maclaurin plant situated there. I was fortunate to be one of the representatives, and I will now submit to you the result of the test, together with a brief description of the plant.

The producer forms the most important part of the plant. It has a capacity of 20 to 25 tons of coal. The highest temperature is at the air blast and for about 3 ft. above that point; the temperature at this zone being in the region of 900° to 1000° C., gradually decreasing upwards to the condenser. The condenser is a cylindrical iron chamber which rests on the top of the producer; the temperature at this point being 60° to 70° C. Should the temperature in the producer fall, more air blast is given till it reaches the desired point.

The scrubbing of the gas is carried out in two scrubbers of the centrifugal type used in series with brush arrangement, the liquor being thrown towards the sides in a fine spray. Weak liquor is circulated through these scrubbers continuously by pumps. The gas, after being washed, passes through a cylindrical chamber designated the "cooler." The function of this apparatus is further to cool the gas, and at the same time condense any oil or liquor carried forward. The unpurified gas is now measured by a rotary meter. During the test, the "Sirocco" type of fan was employed for the air blast and for the suction on the gas-main.

The yield of dry oil recovered during the test was equal to 15·6 gallons per ton of coal. This is of a vastly different nature to, and has a much lower gravity than, coal tar. The liquor shows a smaller yield per ton of coal than in gas-works practice.

Owing to the large percentage of inerts in the gas it is unsuitable for use, to any great extent, as a diluent for coal gas, so long as the latter is maintained at 470 to 500 B.Th.U. per c.ft., but no doubt it could be used with success as a gaseous fuel for steam raising, for gas engines, and for heating retort settings, provided, of course, that it was a commercial proposition—a point which I am not in a position to discuss.

After being screened, the fuel from the retorts is ready for use. At first glance, this fuel resembles ordinary gas-works coke. On closer examination, however, a considerable difference is observed. The structure of the fuel more resembles the original coal, whereas in gas-works coke the bubble or bell shape structure is always in evidence. The fuel is much harder than gas-works coke, and when broken is darker in colour—something midway between coke and coal. A fire was made with this fuel in an ordinary fireplace, and built similar to an ordinary coal fire, using paper and sticks. The fuel kindled as readily as coal; and in a comparatively short time a bright fire was burning, giving off a bluish-white flame without smoke. The opinion formed from this test on the experimental plant was that, given a fair unbiased trial, this fuel would meet a long-felt want, and that with greater experience a still better article could be put on the market.

Summary of Results Obtained on Four Days' Test of the "Maclaurin" Plant.

Coal used	82·8 tons
Hours working (gross)	96
,, ,, (net)	94½
,, lost (due to belt trouble)	1½
Gas made per hour (corrected)	24,298 c.ft.
Total gas made (corrected)	2,296,184 c.ft.
Calorific value (Boys calorimeter)	247 B.Th.U. per c.ft.
,, ,, ("Sigma" recorder)	257 ,, ,, ,,
Temperature of gas at condenser	63° C.
Air-blast temperature	51° C.
Temperature of gas at inlet to meter	31° C.
Air used per hour	14,287 c.ft.
Blast	98 lbs. steam per hour 1131 ,, per ton
Make of coke	45·37 tons
,, oil (dry)	1291 gallons
,, liquor	2590 ,,
Gas made per ton (corrected)	27,731 c.ft.
Coke ,, ,,	11·96 cwt. = 54·8 p.ct.
Oil (dry) ,, ,,	15·6 gallons
Liquor ,, ,,	31·0 ,, = 1192 lbs. of sulphate = 14·5 lbs. per ton

Note.—The washed gas contained ammonia = 2·8 lbs. per ton, owing to inefficiency of scrubbing plant.

P.Ct. Analysis of Gas Made During Test.

Test No.	1.	2.	3.	4.*	5.	6.*
CO_2	6·2	8·4	7·8	6·0	8·2	6·0
C_nH_m	..	0·6	0·4	2·0	0·4	..
O_2	..	0·1	0·2	0·2	..	0·6
CO	14·8	13·1	15 2	15·8	13·4	16·0
CH_4	13·9	12·4	14·7	11·8	14·1	13·0
H_2	18·6	16·5	4·9	17·4	11·2	16·1
N_2	46·5	48·9	56·8	48 6	52·7	48·3
Gross calorific value	262	234	239	221	245	247

* Average samples taken over a period of 24 hours.

Coke Sieving Tests.

	P.Ct.	
Large coke	73·50	
Smithy char.	10·56	(Passed through 1 in. mesh riddle)
Peas	6·92	(,, ,, ½ in. ,, ,,)
Breeze dust	9·02	(,, ,, ¼ in. ,, ,,)

Coal used during test.—The coal used during the test was Cannon Lower Coxrod coal. It appeared to be a well-screened coal with about 70 p.ct. large lumps, of a hard nature and dull appearance, with lustrous streaks. There was a small percentage of bright soft coal; and from its general appearance and composition one would expect it to be a fairly good coking coal.

The analysis of the coal was as follows:

Sp. Gr. 1·34.

	P.Ct.
Moisture	7·7
Volatile matter	30·5
Fixed carbon	53·7
Ash	8 1
	100·0

Sulphur, 0·65 p.ct.
Calorific value = 12,300 B.Th.U. per lb.

Distillation Test on Separated Oil.

Sp. Gr. 1·032.

	P.Ct.
Moisture	1·70
Light oil 0° to 120° C.	0·64
120° to 230° C.	5·47
230° to 270° C.	14·14
270° to 320° C.	16·08
320° to 345° C.	9·96
	47·99
Pitch	48·50
Loss	3·51
	100·0

Analyses of Cokes.

—	Large Coke.	Smithy Char.	Peas.	Coke Dust.
	P.Ct.	P.Ct.	P.Ct.	P.Ct.
Volatile matter	3·00	3·30	3·50	3·30
Fixed carbon	81·20	78·25	71·95	58·20
Ash	13·50	15·50	21 00	33 40
Moisture	2·30	2·95	3·55	5 10
	100·00	100·00	100·00	100·00
Sp. Gr.	1·11	..	..	..
Sulphur	0·44	..	..	..
Calorific value, B.Th.U. per lb.	12,600	12,196	11,283	9,203

Heat Balance Sheet.

B.Th.U.		B.Th.U. per lb.	B.Th.U.
1 ton Lower Coxrod coal, 12,300 B.Th.U. per lb. 27,552,000	8·05 cwt. large coke (smokeless fuel)	12,600	11,360,160
	1·16 cwt. smithy char	12,196	1,584,504
	0·76 cwt. peas	11,283	960,408
	0·99 cwt. breeze	9,203	1,020,428
	15·6 gallons dry oil = 1·44 cwt.	12,600	2,672,600
	27,731 c.ft. gas, 247 B.Th.U. per c.ft.		6,849,557
	Loss		3,104,343
27,552,000			27,552,000

Sir John Cass Technical Institute.—The annual prize distribution at the Sir John Cass Technical Institute, Jewry Street, Aldgate, will take place next Wednesday evening, Jan. 30. In addition to distributing the prizes, Sir William H. Bragg, K.B.E., F.R.S., will give an address on "Research Work and its Applications."

Yorkshire Junior Gas Association.—A whole-day programme has been arranged for the meeting of the Association to take place next Saturday, Jan. 26, at Halifax. Members will assemble at 10.30 at the premises of Messrs. G. H. Gledhill and Sons, Ltd., cash till and time recorder manufacturers, Trinity Works, Harrison Road, Halifax, and after lunch will visit the Corporation Gas-Works in Mulcture Hall Road. A business meeting will follow, at which Mr. W. Heathcote, of Halifax, will deliver his Presidential Address.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Air Pollution and the Products of Combustion.

SIR,—Reading through the editorial notes in your last issue, I gather that Mr. David Brownlie is slightly at sea regarding the respective sulphur contents of the raw coal and the coke produced. With reference to high-temperature coke (such as blast-furnace coke and gas coke) I give here the sulphur contentof a very well-known coking and gas coal from a large Durham colliery, producing an equally well-known coke.

Sulphur in the raw coal, 1·22 p.ct.
The coke produced per ton of raw coal is 64·3 p.ct.
Sulphur in coke, 1·08 p.ct., representing 57 p.ct. of the total sulphur in the raw coal; the balance is to be found in the crude tar liquor and gas.

As far as low-temperature coke is concerned, I give below the sulphur particulars of a coal on which I have carried out a great number of tests.

Sulphur in raw coal, 1·80 p.ct.
Low-temperature coke produced per ton, 73·5 p.ct.
Sulphur in coke, 1·70 p.ct. representing 69·5 p.ct. of the total sulphur in the raw coal; the balance, as above, to be found in the crude tar liquor and gas.

When sulphur or sulphur compounds are combusted, they are oxidized to SO_2, which escapes into the open, irrespective of whether the original sulphur was in the form of "volatile" sulphur compounds or "fixed" sulphur in the coke. The man in the street knows that the sulphur content of the gas is, by cleaning processes, brought down to an infinitesimal fraction, so that the air pollution from the sulphur in the gas is negligible.

The real culprit is the badly-designed, inefficient kitchen-range-foul-gas producers, burning raw coal; and it is particularly the poorer class people, in their tens of thousands, using the cheap and shoddy kicked-together-in-a-hurry range, who, owing to a misplaced sense of real economy, keep on feeding the insatiable monster in their kitchen with raw coal. Once they begin to realize that they are on the wrong track, and that a smokeless fuel is far better, be it high-temperature or low-temperature coke, or gas, London will be able to compete in sunshine records with any town on the South Coast.

A satisfactory solution from the economic point of view of a problem of such magnitude as the air pollution by indiscriminate burning of raw coal, cannot be found in a week or two, and nobody up to the present can justly claim to have solved the problem. All they can claim is to have advanced the knowledge of the nature of coal a little by their successes and failures. It is abundantly clear to thinking people that teamwork on a scale hitherto unthought-of is what is required, and is sure to come, either by official or private enterprise, and preferably jointly.

HARALD NIELSEN.

100, *Victoria Street, S.W., Jan.* 18, 1924.

The New System of Charging at Macclesfield.

SIR,—I have read with interest your editorial comments on the new system of gas charges in vogue in Macclesfield. The offer of ½d. per therm extra rebate to consumers owning approved appliances is one of those instances in which the action of a committee may actually confer more benefits than realized at first.

The Committee's object in granting this rebate was not in any way connected with our power to influence consumers to use proper gas appliances; it arose out of the Committee's decision to abolish simple hire charges on cookers and gas-fires, and to supply these free of cost to the consumer. Two points were considered in this connection. One was that unlimited free fires and cookers would very probably do away with sales; and the other was that, as apparatus which we supply is maintained free, while apparatus purchased by the consumer has to be maintained by him at his own cost, the consumer who purchases apparatus would be placed in an unfavourable position in comparison with the consumer who puts the gas undertaking to the expense of providing him with it.

Two courses were open to the Committee. One was to undertake the free maintenance of all appliances, whether the property of the consumer or the gas undertaking; and the other was to give to the consumer who owned his own appliances some slight benefit in the price of gas to compensate him for having to maintain these apparatus at his own expense. The latter course had the additional advantage that it gave an incentive to the consumers to buy apparatus, rather than to have it free from the Corporation. The procedure at present is that the consumer applies to us for the rebate, stating the apparatus he has which belongs to him or to the Corporation. The house is then inspected; and if the claim is correct in regard to the privately-owned apparatus, the extra rebate is granted. This gives us the opportunity of inspecting the consumer's appliances, and advising him with regard to them, and also involves a periodical re-inspection of the house to make sure that the apparatus is still there. Our experience is that consumers in these circumstances are always grateful for advice given and for information respecting the efficient use of their appliances.

We now have powers in our Act of 1923, clause 112, in the case of any new work or alteration to existing pipes or fittings, to specify the fittings to be used; a sub-clause being inserted stating that "the word 'fittings' in this section means pipes, burners, stoves, heating apparatus, and other fittings used in connection with the consumption of gas." A specification will shortly be published and put into operation under the powers given us by this section.

On page 136 of the "JOURNAL" for Jan. 16 you say—"then further, is there to be any guarantee that the privately-owned appliances which are approved will not be changed for others unless also submitted for approval?" You answer that query yourself a few lines further down, where you say—"it is, of course, something gained to know

that privately-owned gas appliances are such as the gas engineer can approve, as gas consumers *are not in the habit of making frequent changes in such appliances.*"

The extra rebate applies to slot consumers as well as to ordinary meter consumers; and considerable numbers of people have availed themselves of the advantage offered. It has also been a very useful lever in pushing sales of gas-apparatus in the face of the supply of free apparatus. Evidence of this lies in the fact that during the last four months we have sold well over a thousand pounds' worth of apparatus, which, considering the size of the town and the bad state of trade, reflects considerable credit upon the distribution department.

There is another section of our gas charges which, when explained, may be of interest. I refer to the scale of charges for power purposes. The price of gas charged for power now depends upon the consumption per annum per brake horse-power of maximum demand. We found that there were a number of large suction-gas plants in the town, and that, in the majority of cases, they were using town gas for starting up. When considering the sliding-scale for ordinary consumers, we considered also the question of a sliding-scale for power consumers; and in making a survey of our power consumers, we were struck by the fact that in any sliding-scale of the ordinary type the people who would benefit most were the owners of suction-gas plant. They use us simply as a convenience, come on our mains for their big supply at the time when there is also a large demand for gas at the breakfast hour, and take no supply from us during the remainder of the day.

The consumer who is most profitable to us is the man who maintains a steady demand throughout the day, whether the individual demand is large or small. We therefore set out to devise a means of charging which would give the greatest advantage in price, not to the man who uses the largest quantity, but to the man who is most regular. The result was that the present system of charging for power was devised; and under this scale, taking the consumption per brake horse-power per hour at 10,000 B.Th.U., any power consumer, no matter what size his engine may be, who is running that engine for 2000 hours per annum at the maximum load will obtain his supply at the minimum price. Put shortly, the effect of this is that we give the greatest advantage to the consumer who does his best for us.

I may say that since the introduction of this new scale for power, we have obtained, in competition with suction gas, new consumers totalling over 400 horse-power.

FRANCIS W. J. BELTON.

Corporation Gas-Works, Macclesfield, Jan. 19, 1924.

Application of Oxygen to the Manufacture of Gas.

SIR,—In the report of the Department of the Interior Bureau of Mines, Washington, D.C., is an article on the above subject by Mr. F. W. Davis. It is all very interesting; but the whole proposition depends upon the cost of oxygen and the possibilities of using it economically.

The following is extracted from the paper.

"By comparing requirements of the three processes (straight producer gas, water gas, and the oxygen process) we may strike the following rough comparison of costs, using coal at $7·00 per 2000 lbs. delivered, coke at $11·00 per 2000 lbs. delivered, and oxygen at $3·00 per 2240 lbs."

Comparison of Costs per 1000 C.Ft. of Gas.

—	Coal.		Oxygen.		Total Material Cost.	B.Th.U. per C.Ft.	Cost per 1000 B.Th.U.
	Lbs.	Cost.	Lbs.	Cost.			
		$		$	$		$
Straight producer gas .	19·391	0·0678	..	..	0·0678	221	0·000397
Water gas .	37·114	0·201	..	..	0·2041	283	0·000712
Oxygen process . .	33·12	0·1159	6·7	0·009	0·1249	400	0·000312

This gives fuel for gas by the oxygen process at 6·24d. per 1000 c.ft. (1·56d. per therm), as against water gas at 10·205d. per 1000 c.ft. (3·60d. per therm). Oxygen weighs 84·56 lbs. per 1000 c.ft. Therefore, at $3 per 2240 lbs., the cost of oxygen is 5·66d. per 1000 c.ft.

If oxygen is available at anything approaching this figure, then experimental work should certainly be started, as suggested by the author, on these lines; but I can see many difficulties in its application, which, however, might be overcome. The crux of the proposition is the cost of the oxygen.

C. B. TULLY.

"Grey House," Charlton-on-Trent, Newark-on-Trent, Jan. 17, 1924.

Electric Houses.

SIR,—Mr. Paterson need not be surprised at the lack of comment on my letter which appeared in the "GAS JOURNAL" for Dec. 12, 1923, for no reply was called for.

Replying to his queries, full details of the electricity consumption, together with the rates charged, are to be found in the pamphlet referred to by Mr. Jamieson in his Edinburgh address. [See "GAS SALESMAN" for Oct. 31, 1923, p. 189] I might add, however, that preferential terms are in no instance granted to electric houses, whether tenanted by members of the electricity department staff or by the public. The consumer may elect to be charged either (1) on our ordinary maximum demand rates (4½d. and 1d. per unit), or (2) on the multi-part tariff (*i.e.*, a fixed annual charge for the provision of electric service, *plus* ½d. per unit for all current consumed). The latter is the more economical for generous users of electricity.

Frankly, I am at a loss to grasp Mr. Paterson's meaning when he complains of the houses selected for comparison. As stated by me, the gas and electric houses contrasted are identical in design, each contains the same number of apartments, has the same floor area, and the same height of ceiling. In each there is an equal number of occupants. The houses are within 25 yards of one another, have the same exposure back and front, and are, therefore, I should say, subject to identical climatic conditions. If the normal requirements for lighting, heating, and cooking in these establishments cannot be considered approximately identical, I am unable to suggest more equitable conditions for comparison.

Further, I *do* suggest that it is logical to assume that the consumption of gas or electricity is closely related to the size of house. A two-apartment tenement house cannot reasonably be expected to yield the same revenue as (say) a six or eight apartment residence, whether or not the number of occupants be the same. Surely it is unnecessary to elaborate this point.

R. HARDIE.

Glasgow Corporation Electricity Showroom, 251, Sauchiehall Street, Glasgow, Jan. 19, 1924.

REGISTER OF PATENTS.

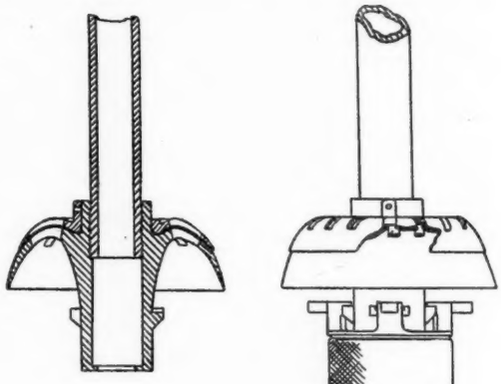
Gas-Mantle Fitting.—No. 208,307.

KNIGHT, E. O., of Liverpool, and M'KECHNIE, E. W., of Bayswater.

No. 29,286; Oct. 27, 1922.

This invention relates to the burner heads of incandescent gas burners, and has for its object "to consume the fumes which normally rise and cause a carbonaceous scale or deposit on the metal burner fitting." The patentees remark that when an inverted gas mantle is lit and the usual burner fitting is cold, rapid expansion of the latter takes place, with the result that the scale which usually adheres to the portion of the fitting above the mantle, cracks, due to its expansion and that of the metal, flies off, and drops into the mantle, puncturing the latter.

FIG. 1. FIG. 2.



J. Knight's (decd.) Burner Head.

We reproduce a section and elevation of a burner head, according to the invention. It comprises a cone-shaped mantle-support of fireclay or porcelain provided with a central passage for connection with the mixing tube and suitably spaced slits formed in the upper portion. The latter curves round and downwards to a fine edge, the diameter at the edge being greater than the width of the mantle itself. Means are provided for controlling the degree of opening of the slits.

It is claimed that "in use the unburnt fumes from the mantle are tapped in the upper portion of the burner head which, becoming incandescent, consumes the fumes, and so prevents the formation of scale on the mixing tube, discoloration of the ceiling, and contamination of the air of the room; said burner head also causes compression of gas in the interior of the mantle, thereby increasing its brilliancy with reduced consumption of gas."

Wheels.—No. 208,340.

DEMPSTER, R., AND SONS, LTD., of Elland, and FRAZER, J., of Glasgow.

No. 31,403; Nov. 17, 1922.

This invention relates to wheels which run on rails or tracks and are kept in position by one or more flanges. The wheel is described in the specification as applied to a mono-rail telpher.

The patentees point out that the noise produced under certain conditions is due to the slip which takes place between the wheel flange and the track when the flange bears against the latter—for example, when the wheel is going round a curve. Its intensity is varied by the materials of which the wheel and track are composed. To overcome this objection, the portions which are used for guiding purposes are, according to the patent, arranged to rotate independently of the portion which constitutes the tread, so that they can accommodate themselves to the required surface speed and run in contact with the rail without any appreciable amount of slip taking place.

Each flange is rotatably mounted upon the centre portion of the wheel and is kept in position thereon by a ball thrust bearing which is

situated between the wheel flange and a stationary bearing or housing. The wheel and flanges may be formed with pockets for containing graphite or other lubricant, or they may be otherwise lubricated. If the wheel is used for a mono-rail telpher, it is advantageously constructed from mild steel case-hardened. A somewhat similar construction of wheel made from phosphor bronze, or other suitable metal, can be used as a collector for use in connection with an electric conductor.

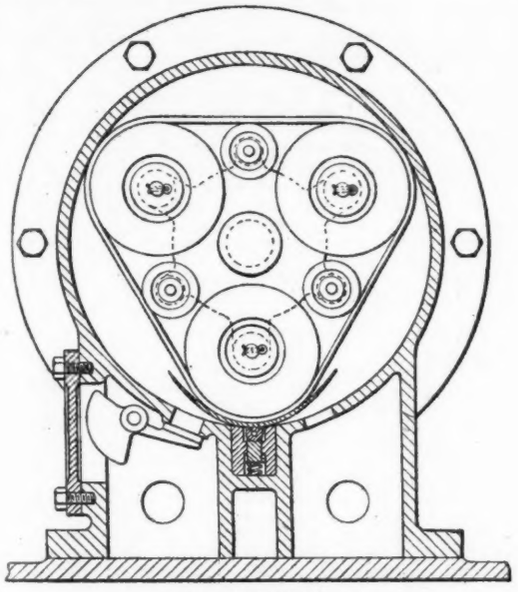
Gas and Air Compressors or Blowers.
No. 208,477.

PALMER, J. F., of Wood Green, N. 22.

No. 12,494; May 9, 1923.

(Patent of Addition to No. 179,324 of Feb. 8, 1921.)

This invention is a modification of that described in specification No. 179,324 [see "JOURNAL" for June 28, 1922, p. 892]. The modified blower, of which we give a vertical section, comprises an endless band, constituting the flexible member, and an abutment operated by the passage of the rotatable member to prevent escape of fluid from the compression chamber to the inlet space.



Palmer's Modified Blower.

The abutment comprises a rocking plate in the form of a shoe, attached to the drum and exactly fitting between the end walls of the casing, the shoe extending so as to rise up to the band and form the effective end face of each compression chamber as formed by the passage of the rotatable member. The latter positively rocks the shoe into position as each compression chamber is formed.

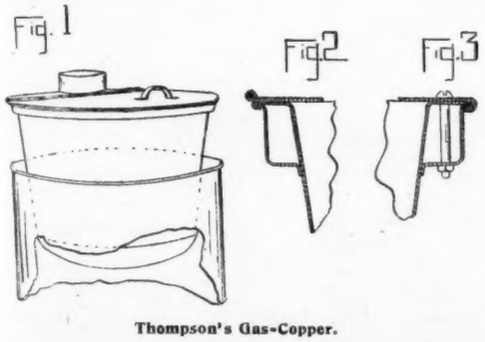
The rotatable member comprises three pump rollers carried on a rotatable spider frame. As the band becomes the wall of the compression chamber, it tends to bulge under the distributed load of the gases, especially if the centrifugal force of the rollers is small; and to prevent this bulging idle rollers are interposed between the pump rollers to support the band.

Domestic Gas-Boilers.—No. 208,600.

THOMPSON, A., of Bolton.

No. 26,165; Sept. 28, 1922.

This invention relates to gas wash-boilers, its object being to enable the tops thereof to be made of sheet metal in place of cast iron; the latter construction being described by the patentee as "frangible and comparatively expensive to produce."



Thompson's Gas-Copper.

Accordingly, it is provided that the pan should have an upper flange projecting laterally, which is turned under to retain an additional rim or annular member of copper or any other suitable metal. The outside diameter of this annular member is such that it fits snugly within the body part, and has at its upper end a flange which is held by the overturned flange of the boiler. The lower end of this additional rim fits closely to the wall of the pan. The upper edge of the body part of the boiler is wired so that the flange of the pan may rest upon it.

The top of the boiler is formed in two parts, one fixed to the pan and the other forming a lid. The fixed part is secured to the pan by bolts, as seen in fig. 3; fig. 2 showing the construction of the forward part, where the removable lid is situated.

The top of the boiler may be of cast iron; but sheet metal stamped to the required size and shape is preferred. In this latter case the flange of the pan may be arranged to depend so as to cover from view the wired edge of the body or cover.

Coin-Change Mechanism.—No. 208,615.

MAJOR, P. F. E., of Shepherd's Bush, MILES, G. H., and SMITH, C. C., both of Twickenham.

No. 28,556; Oct. 20, 1922.

This invention relates to coin-change mechanism in prepayment meters, and provides an arrangement for preventing the insertion into the coin-carrier of additional coins when the coin tube is full, until change has been obtained by the insertion of a coin of higher denomination. Two forms of the arrangement are described and illustrated.

In the simpler form, a pivoted lever is positioned so that its lower end just projects into the coin tube. When the latter is getting full, the coins press the lever outwards, and its upper end intercepts the path of a radial arm mounted on the prepayment actuating spindle which revolves the coin carrier. Thus the slot is prevented from coming into position for taking further coins.

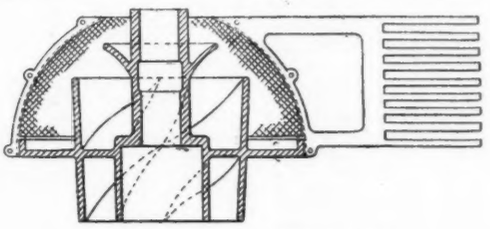
The second form acts on a like principle; but the upper end of the lever in this case rocks a supplementary catch lever which engages a projecting pin mounted on the end of the coin-receiving drum.

Scrubbers.—No. 208,632.

LLOYD, E., and SIMON CARVÉS, LTD., both of Manchester, and MELDRUMS, LTD., of Timperley.

No. 33,532; Dec. 8, 1922.

This invention relates to apparatus of the kind covered by specification No. 206,174 [see "JOURNAL" for Dec. 12, 1923, p. 720]. Its object is to improve the atomizing device therein described; and accordingly it provides for two or more extending arms carrying a comb to be applied to the atomizer. The illustration herewith gives a clear idea of the arrangement in simple form; but the specification points out, and claims, that the arms or teeth may be made part-special, to assist in circulating the gas through the apparatus. Further, the arms may be curved and/or tangential instead of straight and radial; and more than two may be provided with each atomizer.



Modification of Messrs. Meldrums' Scrubber.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Jan. 16.]

Nos. 389 to 970.

ANDERSON, J.—"Valves for gas-meters." No. 867.
ANDERSON, J.—"Measuring-out mechanism for gas-meters." No. 868.
BAILEY, R. W.—"Gas and oil power plant." No. 658.
BECKER, J.—"Coking retort oven batteries." No. 952.
BRITISH ARCA REGULATORS, LTD.—"Reducing valves." No. 627.
COURT, W.—"Gas-mantle guard." No. 961.
DEMPSTER, R., AND SONS, LTD.—"Valves for controlling flow of gas through purifiers, &c." No. 686.
DRAKE, J. W., and DRAKES, LTD.—"Apparatus for measuring and delivering coal, &c." No. 898.
FLAVEL, P. W.—"Cooking ovens." No. 844.
GAS-METER COMPANY, LTD.—"Automatic lighting control apparatus." No. 869.
HORSFALL, J. E.—See Dempster, R., and Sons, Ltd. No. 686.
KING, W. E.—See Gas-Meter Company, Ltd. No. 869.
KOPPERS COMPANY.—"Regeneratively-heated retort oven batteries." No. 954.
LINDSAY, T.—See British Arca Regulators, Ltd. No. 627.
LUMB, H.—See Dempster and Sons, Ltd., R. No. 686.
METROPOLITAN-VICKERS ELECTRICAL CO., LTD.—See Bailey, R. W. No. 658.
WHITEWELL, G. E.—"Production of water gas." No. 966.
WILLIAMS, G. B.—"Ventilating ovens of gas-cookers." No. 585.

Towns Without Gas.—Floods caused by the overflow of the local river, owing to heavy rains, led to the inundation of the Clonmel Gas-Works, which was put out of action, thus depriving the town of its gas supply. Carrick-on-Suir (co. Tipperary) was in similar plight for some days.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF COMMONS.

Gas Regulation Act.

Copies were presented of drafts of Special Orders proposed by the Board of Trade under the Act on the application of the Adbridge, Wycombe, and District Gas Company; Bedford Gas Light Company; Brierley Hill District Gas Light Company; Eastbourne Gas Company; Hyde Gas Company; Marple Urban District Council; Nelson Corporation; Newquay (Cornwall) Gas Company; Tynemouth Gas Company; Wolverhampton Gas Company]; and York Town and Blackwater Gas Company.

Public Utility Companies (Capital Issues) Act, 1920.

Copies were presented of reports on applications to the Board of Trade under the Act by the Colwall Gas Company, Harpenden District Gas Company, and Titchfield District Gas Company.

LEGAL INTELLIGENCE.

GAS UNDERTAKINGS AND THE MANUFACTURE OF CHEMICALS.

HIGH COURT OF JUSTICE.—CHANCERY DIVISION.

Thursday, Jan. 17.

(*Before Mr. Justice* ASTBURY.)

Deuchar v. Gas Light and Coke Company.

This case raised an important question affecting many gas companies—viz., their right to manufacture chemicals.

Mr. MAUGHAM, K.C., Mr. HUNTER GRAY, K.C., and Mr. DIGHTON POLLOCK appeared for the plaintiff—Mr. John Lindsay Deuchar, Secretary of the Castner Kellner Alkali Company—and Sir JOHN SIMON, K.C., Sir A. COLEFAX, K.C., Mr. WILFRED GREEN, K.C., and Mr. UTHWATT for the defendants.

THE CLAIM.

Plaintiff claimed a declaration that the manufacture by the defendant Company of any chemicals or other substances necessary or convenient for the treatment, compounding, conversion, or otherwise rendering marketable of any products, refuse, or residue arising, remaining, or produced by the making of gas or the materials used therein, and the erection by or on behalf of the defendant Company of any factory or building for the purpose of any such manufacture as aforesaid, and the application of the funds of the defendant Company or any part thereof in and towards such manufacture or erection of buildings, were not authorized by the Company's Act of 1868, or any other Act subsequent thereto wherein statutory powers had been conferred upon the Company, but that such manufacture, erection of buildings, and application of funds by the defendant Company were *ultra vires*. An injunction was also asked restraining the defendant Company from manufacturing any such chemicals or other substances so necessary or convenient, and from erecting any factory or building for any such purpose, and from applying, or authorizing, or permitting the application of, the funds in or towards the manufacture of any such chemical or other substances, or the erection of any factory or building for any such purpose.

By the defence, defendants said that one of the residuals arising from the making of gas was naphthalene; and one of the ordinary commercial methods of dealing with this substance was to convert and manufacture it into beta-naphthol. This was a proper method, both economically and commercially, of dealing with the naphthalene; such conversion and manufacture was accordingly necessary and expedient for the proper and economical carrying-on of the undertaking, and the performance of their statutory objects. They further said that for the purpose of the conversion and manufacture it was necessary to utilize caustic soda; and the best and most economical results were achieved by the use of caustic soda of fine quality and in liquid form. For many years past the defendants had treated, converted, and manufactured into beta-naphthol, naphthalene produced by them, and had for that purpose purchased caustic soda. As the prices charged for this had been so unreasonable and excessive, the defendants, with a view to economy, had recently erected on lands acquired under the Act of 1876 a factory and plant for the manufacture of caustic soda by the electrolytic process. This factory and plant were of a capacity sufficient to provide caustic soda not exceeding the amount necessary for treating their naphthalene, and were adequate to supply caustic soda of the necessary quality in liquid form. In the course of making caustic soda at the factory, chlorine necessarily resulted as a bye-product. Caustic soda in liquid form of the quality required could not be made except by the electrolytic process or without chlorine resulting as a bye-product. The cost of manufacturing caustic soda at the factory would be considerably less than the cost of buying the same in the market; and defendants intended to use the caustic soda only for the purpose of treating naphthalene in the making of gas and of converting and manufacturing it into beta-naphthol. Defendants submitted that what they were doing was within their powers. They further, or in the alternative, pleaded that chlorine was required for the conversion and manufacture of products or residuals arising, remaining, produced by, or obtained from the making of gas in accordance with ordinary commercial methods of dealing with such bye-products or residuals, and the whole of the chlorine resulting from the factory was not more than was required for the purpose, and such manufacture was within their powers.

OPENING THE CASE.

Mr. MAUGHAM said plaintiff had bought a comparatively small quantity of stock in the defendant Company, with the object of raising the question in dispute. He was Secretary of the Castner Kellner Alkali Company, and it was by this action that chemical manufacturers were seeking to urge the point that gas companies were not entitled to manufacture substances which they might require for the purpose of treating their residuals. The manufacture of gas necessarily involved the production of a large number of residuals—such as tar, which was capable of being split up into many other things, including naphthalene. For the purpose of converting these residuals, gas companies had formerly purchased the chemicals from chemical manufacturers, but recently they had conceived the notion that, as they required caustic soda for the purpose of treating the residuals, they were entitled to lay down costly and expensive plant on land they had acquired under the authority of Acts of Parliament, and to act as manufacturers of caustic soda, in order that they might apply the soda in treating naphthalene, and converting it into beta-naphthol. This raised a very important and serious matter for chemical traders in the country, because it could not be disputed that the defendant Company, like other gas companies, were in an exceptional position; they possessed a monopoly for the supply of gas in their own area, and they had, through statutory powers, become entitled to acquire lands and to raise capital on easy terms. Their main revenue was derived from the making of gas; but it was apparent that, by making this very large revenue from gas, they could afford to cut the profits (if they so desired) from any bye-products or from any chemical such as caustic soda which they might manufacture—they might even be prepared to sell them at a loss. Having called attention to the provisions of the various Acts, he submitted that what the defendants were doing was *ultra vires*.

His LORDSHIP observed that the Company had power under the Act to manufacture all products arising from, or which were produced by, the making of gas; and he did not see how they could do so unless they could manufacture the bye-products.

Mr. MAUGHAM said he did not object to their buying caustic soda and converting the residuals, but he objected to their making the caustic soda. They could buy coal, but they had no power to open a coal mine; they could buy caustic soda with which to treat the residuals, but they could not set up as manufacturers of caustic soda, for they were not authorized to do so by their Acts.

His LORDSHIP: Suppose they only make enough caustic soda required for their own use, do you say they are manufacturers of caustic soda?

Mr. MAUGHAM said that that was his contention. They could make beta-naphthol, for they were expressly authorized to convert and use naphthalene, which was a product arising from the making of gas. In erecting a factory and installing the caustic-soda plant, the defendants were going outside the objects of the Act.

His LORDSHIP: They can erect works to make beta-naphthol, but that cannot be made without caustic soda.

Mr. MAUGHAM: Because a company are authorized to carry on a particular undertaking, they are not authorized to manufacture all the particular things required for the purpose of the undertaking. Though the defendants say their works are only sufficient for the manufacture of caustic soda required for their own use, they do not offer any undertaking not to use the caustic-soda plant for any other purpose or not to turn it into bleaching powder. If the action failed, there would be nothing to prevent defendants from selling caustic soda. Having cited various authorities in support of his proposition that the defendants were acting *ultra vires*, he said he would call evidence to show what were and what were not residuals.

Mr. *H. Ballantyne*, a well-known chemical expert, was called; and he described the process of making gas from coal. He said that coke was left in the retorts, and on cooling the volatile products, tar and ammoniacal liquor were separated, and by washing the gas with water certain products were separated. In no stage of the production of gas was caustic soda or chlorine obtained. Assuming the defendants had the right to make chlorine, it could be combined with lime to produce bleaching powder, with soda to produce chlorate of soda, or with potash to produce chlorate of potash, and with benzole, toluole, and other products. There was an endless series of bodies which could be prepared with chlorine. With soda one could make soap, sodium silicate, sodium chlorate, and so on. He could not see any limit to which caustic soda might not be applied. If chlorine was also produced, it increased the number of compounds that could be obtained. Many dyes could be made from the bye-products, and they would extend into practically every organic chemical trade.

Cross-examined by Sir JOHN SIMON: Naphthalene should be regarded as one of the residuals of the making of gas. If one was entitled to convert naphthalene, the conversion might take place by the use of caustic soda and its reagent, so as to make beta-naphthol. It was a question of law whether defendants could make, instead of buying, these articles; but assuming they had a right to make them, it could only be done by the electrolytic process, which involved the use of electric current.

This was the case for the plaintiff.

THE DEFENDANTS' CASE.

Sir JOHN SIMON said the question was really one of construction and of law, and not of evidence. The Court was not entitled to go into the question of what could be made from the various constituents. The defendants had never sold caustic soda—in fact, they did not manufacture sufficient to meet their own requirements.

Mr. *John Henry Olliver*, of the Sales Department of the Gas Light and Coke Company, was called, and said it was a fact that the Company had set up an electrolytic plant which produced caustic soda and a certain amount of chlorine. They had never sold, or attempted to sell, any caustic soda. The capacity of the plant was not more than sufficient to provide the caustic soda needed as a reagent in converting the naphthalene—indeed, it was not sufficient for the purpose.

In cross-examination, witness said they had sold a certain quantity of bleaching powder.

Re-examined: The bleaching powder plant used up the chlorine produced by the electrolytic process.

Sir JOHN SIMON submitted that naphthalene was a product or residual obtained from the making of gas; it was converted into beta-

naphthol by means of a reagent, caustic soda; and it was not disputed that it was perfectly legitimate for the defendants to buy caustic soda. Instead of purchasing all the caustic soda needed for converting the naphthalene into beta-naphthol, the defendants had taken steps to produce it. It was established that the production was limited to what was required for their own use; they did not propose to sell any. The defendants' only object being to produce caustic soda, they were doing this in the proper way by the electrolytic method, and necessarily a certain amount of chlorine and hydrogen resulted. The proper way of disposing of the chlorine—which they had to get rid of—was by making bleaching powder of it. His last point was that there were other proper chemical processes in which chlorine could be combined with other products of gas. In spite of this it was asked that the defendants should be restrained from manufacturing by the electrolytic process. Why? If there was any ground for suggesting that defendants were entering into the market and selling caustic soda, he could understand that it would be open to the Court to say that they must not set up in such a business; but this was not the case. All they were doing was to make their own caustic soda instead of purchasing it at a higher price. In doing so they were not exceeding their statutory powers. The question really was whether what defendants were doing was reasonably incident to their primary statutory purpose, which was the making of gas, and converting the residuals.

Friday, Jan. 18.

Sir JOHN SIMON, resuming, dealt with the authorities which had been relied upon as supporting the plaintiffs' case, and contended that they had no bearing upon the present action, as they dealt with statutory railways. He agreed that a railway which was authorized to carry passengers by road could not carry them by steamer, though they had the right to build their own railway carriages.

Mr. GRAY remarked that this power was given by the Railway Clauses Act.

Sir JOHN SIMON said the defendants had power to construct all such works for the manufacture of gas as they might require, deem necessary, or consider expedient for the efficient carrying-on of the business. Section 43 of their Act said that they might provide such materials, and do all such things, as they might deem requisite for those purposes; and "those purposes" included the manufacture of products obtained from the making of gas, and for converting naphthalene. Of course, they were entitled to purchase in the market; but this did not preclude them from making it. By Section 40, they were authorized to make gas, and convert, manufacture, and deal with all residuals; and unless it was said that those words contained a prohibition against producing, combined with permission to purchase, the ingredients necessary for conversion, there was really no more to be said. As the Company were carrying on the business for which they were authorized, he respectfully submitted that the action had been brought in error, and ought to be dismissed, with the usual consequences.

REPLY FOR THE PLAINTIFF.

Mr. HUNTER GRAY, in reply, argued that what the Company were doing did not come within any of the authorized objects. If they wished to continue doing what was complained of, they should go to Parliament and obtain the necessary power. There were various different things specified in the Act of Parliament which the Company were in terms authorized to do, but none had any relation to bodies used for converting residuals. It was inconceivable that the making of chemical bodies by the defendants was authorized, when not one was mentioned in the Act. The making of caustic soda for working-up residuals was in no sense incidental to converting a residual from coal gas.

JUDGMENT.

His LORDSHIP said the plaintiff, who was an ordinary stockholder of the defendant Company, sought to prevent the Company from making, as distinct from purchasing, a certain chemical which was a necessary ingredient in converting one of the gas residuals which they had power under the Statute to convert. The point to be determined was an extremely short one, though of great importance. The defendant Company had been in existence for many years, and were now governed by various Private Acts; the main object being to make and distribute gas. But they also had power to work-up the various residuals produced in the making of gas. One of the residuals of gas-making was naphthalene, and a well-known article of commerce called beta-naphthol was made by treating naphthalene with caustic soda. It was admitted by the plaintiff that the defendants were entitled to make beta-naphthol under their statutory power, using caustic soda as a reagent, and that they were entitled to buy such caustic soda as was necessary for the purpose. Here came in the divergence in view of the plaintiff, as representing the Castner Kellner Alkali Company, the makers of caustic soda, and the defendants. Defendants found they could make caustic soda for the purpose of converting naphthalene, at less than one-third of the price which they had to pay in the market, and they proceeded to make it, with the result that the Alkali Company, through their Secretary, sought to obtain a declaration that the defendants were not entitled to make caustic soda for the purpose of conversion. The case turned entirely on the true construction of the Statutes governing the defendant Company with regard to their objects and powers. A large number of authorities had been cited, but the law was clearly stated in "Buckley on Companies" in the following way:

> The Statute does not create a corporation at Common Law. It creates a statutory creature which cannot go beyond its Statute for the reason that to the Statute it owes its whole existence. A statutory corporation created by Act of Parliament for a particular purpose is limited as to all its powers by the purposes of its incorporation as defined by that Act. The objects which the Corporation may legitimately pursue must be ascertained from the Act itself; and the powers which the Corporation may lawfully use in furtherance of these objects must either be expressly conferred or derived by reasonable implication from its provisions.

Neither side disputed that this was the law; the difference between them was the application of these principles. It was not alleged that defendants had manufactured more caustic soda, or chlorine, than they could use up in treating their own residuals. The manufacture objected to was the manufacture of caustic soda for converting naphthalene into beta-naphthol, which defendants were clearly entitled to make. Under section 40 express power was given to convert naphthalene, and to manufacture residuals; and to "manufacture" must be given a fairly wide construction, such as doing something to the residuals when obtained. The most approved method of converting naphthalene into beta-naphthol was by the use of caustic soda. Assuming that the defendant Company was entitled to convert naphthalene into beta-naphthol by means of caustic soda, and that it was "convenient and beneficial" to the interest of the Company that they should make such caustic soda as was required, the manufacture would be, and was, for the conversion of naphthalene into beta-naphthol. Section 43 was in wider terms, for it gave power to "provide such materials, and do all such other things as they deemed requisite for the purpose." In other words, they might make beta-naphthol and caustic soda, and use caustic soda for that purpose. By the Act of 1876 the defendant Company were entitled to acquire land and erect, maintain, and use on that land works for storage and manufacture of gas, and for the conversion and storing of residual products. Therefore a building was provided for the conversion of naphthalene into beta-naphthol, and it enabled the Company for that purpose to manufacture the necessary quantity of caustic soda. That was within the plain words of the section. There was also power to erect and maintain the necessary works. In support of the plaintiffs' contention a number of cases had been cited and relied on, but in his Lordship's view they had no application to this case. In making caustic soda chlorine was produced, and no doubt by law they were not entitled to store chlorine in this country. If it was produced, it must be got rid of; and if defendants were entitled to make caustic soda, he thought they were also entitled to use up any chlorine by some other conversion of residuals. It was suggested that the defendants intended to convert chlorine into bleaching powder; but, as no evidence had been given about this, he did not propose to deal with it further. Plaintiffs' real grievance was that it was not one of the objects of the defendant Company to make caustic soda. No one said that it was, though defendants said that one of their objects was to convert naphthalene into beta-naphthol. To do so they were entitled to make caustic soda. The true test was whether the thing objected to was reasonable to assist in carrying out one of the statutory objects of the Company. There was nothing in the Statutes which in any way indicated the method by which they were to obtain the article necessary for conversion; and in the absence of any statutory provision he could not understand why it was any worse for the Company to make caustic soda than to buy it in the market. If they could make it cheaper and more efficiently, they were entitled to do so. Defendants were in no sense setting-up as caustic-soda or as chemical manufacturers. If they were *bona fide* carrying out one of the statutory objects, the method of doing so was immaterial unless it was circumscribed by the statutory constitution. As defendants had not done, and were not proposing to do, anything *ultra vires*, the action failed, and must be dismissed with costs.

Stealing Gas With a Cycle Tyre.

At the Congleton Police Court last week, John Worrall, a gardener, was summoned for unlawfully connecting a pipe to the Congleton Corporation gas-main, and stealing gas. Defendant failed to put in an appearance. Mr. E. A. Plant (Town Clerk), on behalf of the Corporation, said defendant was an authorized consumer of gas from the Corporation on Oct. 10, but on this date, owing to the non-payment of his account, the service to his house was disconnected by a gas-works' employee, who removed the meter, and fixed a cap on the pipe. It was discovered on Dec. 2 that gas was being burned in defendant's house; and another employee from the works, with two police officers, entered the house, and found that the cap on the service main had been removed and a rubber tube attached, which defendant had connected to the service pipe in the house. There were five lights burning. Defendant admitted that he had connected the pipes by means of the inner tube of a bicycle tyre. Defendant was fined £2, or fourteen days' imprisonment.

Combined Metal Display at Wembley.—One of the interesting sections in the Palace of Industry at the British Empire Exhibition will be that organized by a Joint Committee of the Non-Ferrous Metal Trades. Seven trade associations are uniting to put up this exhibit, which will cover some 2500 sq. ft. It is a collective effort by a group of trades as a whole, and no makers' names will be shown individually. Over eighty firms are actually represented by the various associations, and more than fifty are supplying the goods to be displayed. The exhibit is to cost about £7000. Specimens of non-ferrous metals in tubes, wire, cold-rolled strip and sheet, hot-rolled strip and sheet, forged copper, nickel silver, &c., will be on view; and the Associations, will show the chief uses to which their goods are put. The primary metals with which they are concerned are copper, brass, nickel silver, and their various alloys.

More Light at Walsall.—There have been frequent complaints at Walsall respecting the public lighting. At a meeting of the Town Council last week, it was reported that there were 373 lamps in the borough which had not been lighted since war-time restrictions were imposed; but it was then announced that these were to be utilized again for the remainder of the winter. The Gas Committee reported that, in reply to an inquiry by the Public Works Committee, they had intimated that, having regard to the fact that it would cost £4 18s. 9d. to equip each lamp, they were prepared to light them for the remainder of the quarter for 15s. per lamp. This the Public Works Committee were unable to accept, as no provision had been made in the current year's estimates; and though they had ascertained from other boroughs which owned gas-works that the average charge was higher than that suggested, the Gas Committee were willing to meet the Public Works Committee by lighting the lamps without further payment. This would involve an expenditure of £1850.

MISCELLANEOUS NEWS.

CONTRIBUTION TO THE GAS FUND.

In pursuance of the powers conferred upon them by section 7 of the Gas Regulation Act, 1920, the Board of Trade prescribe that:

1.—The rate of contribution to the Gas Fund for the year 1924 shall be two shillings for each million cubic feet of gas sold during the year 1923.

2.—Such contribution shall, on or before April 1, 1924, be paid to the Board of Trade at Great George Street, London, S.W. 1, by any gas undertakers with respect to whom an Order under the said Act shall have been made, by cheque made payable to the "Assistant Secretary for Finance, Board of Trade," and crossed "Gas Fund Account."

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" with regard to applications to the Board of Trade for Orders under the Gas Regulation Act.

Borough of Brighouse.

The maximum price now authorized in respect of the supply of gas by the undertakers is 4s. per 1000 c.ft.; and the price which they have asked the Board of Trade to substitute for this is 1s. 2d. per therm.

The undertakers have also asked the Board to provide in the said Order that for a period of three years from the date thereof the minimum permissible pressure in the area of supply outside the borough, and within the borough in the area known as Sunny Vale and the area south of the junction of Tofts Grove and Church Street, Rastrick, shall, in pipes of 2 in. and upwards, be such as to balance a column of water 15·10ths of an inch in height.

AMENDING ORDER.

Commercial Gas Company.

The Board of Trade give notice that the London County Council have made application under sub-section 3 of section 1 of the Act for an Amending Order revising the powers of charging authorized by the Commercial Gas Company (Charges) Order, 1921, by reducing the standard price prescribed by that Order.

Any person affected desiring to make representations with regard to the application, may do so by letter addressed to the Director of Gas Administration, Board of Trade, Great George Street, S.W. 1, not later than Jan. 26. Copies of such representations must at the same time be sent to the London County Council and to the Commercial Gas Company.

GAS REGULATION ACT ORDERS.

We have received from the Director of Gas Administration copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

Birstall Urban District Council.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 15·6d. per therm. (Jan. 12.)

Burton-upon-Trent Corporation.

After the declared date: (i) The price of 14d. per therm shall be substituted for the maximum price prescribed by section xxviii. (limiting price of gas) of the Town of Burton-upon-Trent Act, 1853, as amended by Article III. (reduction of maximum price for supply of gas) of the Burton-upon-Trent Order, 1913; (ii) "4d. per therm" shall be substituted for "1s. 8d. per 1000 c.ft." in paragraph (2) of Article IV. (extension of gas limits of Corporation) of the Burton-upon-Trent Order, 1911; (iii) "3d.," "2·4d.," "2d.," and "therm" shall be substituted respectively for "1s. 6d.," "1s.," "10d." and "1000 c.ft." in the proviso to paragraph (2) of Article IV. (extension of gas limits of Corporation) of the Burton-upon-Trent Order, 1913; and (iv) "2d. per therm" shall be substituted for "10d. per 1000 c.ft." in section 3 (application of the Gas-Works Clauses Act, 1847) of the Burton-upon-Trent Corporation Gas Order, 1923, and "2·4d.," "4·8d.," and "therm" shall be substituted respectively for "1s.," "2s.," and "1000 c.ft." in section 8 (price of gas in added limits) of that Order. (Jan. 12.)

Glasgow Corporation.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 11d. per therm. (Jan. 15.)

Paisley Corporation.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 13d. per therm. (Jan. 11.)

Preston Price Reduced.—The Preston Gas Company announce that the gross price for gas is to be reduced by 1½d. per therm, equivalent to 7⅛d. per 1000 c.ft. Special discounts are being allowed to consumers of over 480 therms (100,000 c.ft.) per quarter.

Chemical Manufacturers and Wembley.—The Council of the Association of British Chemical Manufacturers, at their last monthly meeting, had before them a list of donations amounting to nearly £4000 towards the scientific display at the British Empire Exhibition, and expressed themselves as very gratified at the response that had been made to the appeal.

HORIZONTAL RETORTS FOR GLASGOW.

At a recent meeting of the Glasgow Corporation Gas Committee it was reported that Councillors Burt, Munro, J. B. Paterson, and Renfrew, along with the Town Clerk, and the General Manager (Mr. J. W. M'Lusky) had been asked to visit and inspect horizontal through retorts in operation at Manchester, Beckton, and Wandsworth Gas-Works, and to report.

After consideration of the report submitted by the deputation, the Committee agreed to recommend that a scheme of horizontal through retorts, to be adapted to the existing foundation and roof in the Tradeston retort-house, and with coke-handling plant designed to suit the travelling crane at present in use, be prepared on similar lines to the installation inspected at Wandsworth, and that competitive offers for the necessary plant be obtained.

After discussion, Councillor Munro, seconded by Bailie Angus M'Dougall, moved the approval of the report and recommendation. Councillor Burt, seconded by Bailie Fletcher, moved, as an amendment, that the report and recommendation be generally approved, but that a further inspection of the Wandsworth retorts be made, and a test carried out therein with Scotch coal. On a vote being taken, by a show of hands, six members voted for the motion, and six for the amendment. The vote being equal, the Chairman gave his casting vote in favour of the amendment.

INSURANCE STUDENTS AT THE OLD KENT ROAD WORKS OF THE SOUTH METROPOLITAN GAS COMPANY.

A party of students in Gas Manufacture and Supply, some thirty or forty in number, attached to the various London insurance companies' offices, through the courtesy of Mr. J. M'Leod, General Manager of the South Metropolitan Gas Company, attended at the Old Kent Road works of the Company for a visit of inspection. They were accompanied by Mr. W. J. Liberty, and were met by Mr. F. A. Frost (Superintendent of the Old Kent Road works) and his Assistants (Mr. A. Gibson and Mr. Saunders), who accompanied them round the works in three parties, commencing with the retort-houses and going through the exhauster-house, condensing, scrubbing, washing, and purifying processes, the shops and burner factory, and the chemical and physical laboratories—where Dr. Thomas received the party, and explained the calorimeter and other matters to them. At the end of the visit the party were entertained at tea in the mess-room, and Mr. E. White (Law Union and Rock Assurance Company) proposed a hearty vote of thanks to Mr. Frost and his assistants for the trouble they had taken in explaining many things which otherwise, when they came to the examination room, would have been unknown to them. Mr. Eric R. Liberty (of the same Company) seconded the vote, and stated that Mr. Frost had certainly elucidated many matters connected with the manufacture of gas which would materially assist them in viewing the process from an insurance point of view. Mr. Frost having replied, Mr. W. J. Liberty asked him to convey to Mr. M'Leod their thanks for the privilege of the visit, and also for the Company's hospitality.

THE JAMES KEITH HALL.

An interesting function took place at Arbroath on Jan. 16, when the James Keith Hall, formerly known as St. Paul's Hall, and which has been converted into a club for the workers of Messrs. Keith & Blackman, was formerly opened by Mr. George Keith. The generous gift of the firm is highly appreciated by the members of the staff; and the action is one which demonstrates in a practical manner the excellent relationship that exists between the Board of Directors and the employees. The hall has been splendidly equipped, and the club will doubtless prove a source of attraction to the workers both young and old.

Following the opening ceremony, the employees, numbering over 300, were entertained to tea as the guests of the Directors. Subsequently an interesting item on the evening's programme was a presentation to Mr. John Crichton, one of the veteran employees, who has just retired after serving the firm for thirty years as a brass finisher. From the Directors, Mr. Crichton received a cheque and a silver tobacco box, and from the employees a handsome clock, a pipe, and a tobacco pouch.

Mr. KEITH said they all hoped and believed that the club would provide facilities, which had hitherto been somewhat deficient, for social enjoyment and wholesome recreation among the employees of the firm and their friends. It was hardly necessary, however, for him to say that it rested with the employees themselves to make a real success of it; but the Directors felt sure, from the interest already shown, and the keenness of the Executive Committee of the Club, that they would leave nothing undone to ensure this. Personally he took a particular interest in the scheme, because, like his father, after whom the Hall was named, he was a true "Red Lichtie," having been born and partly brought up and educated in Arbroath. In addition, he had served part of his time in the Arbroath works, so that anything which affected its welfare had a special place in his heart.

Hatfield Gas Capital Issue.—The issue of £6000 of 6 p.ct. preference stock in the Hatfield Gas Company, Ltd., offered for tender by Messrs. A. & W. Richards, was considerably more than twice subscribed. The tenders ranged from £102 10s. down to the minimum price of £95 per £100 of stock.

Price Reduction at Mossley.—The Mossley Corporation have again reduced the price of gas, and in doing so have returned to pre-war figures. The new charges are: For trade purposes, in the borough, 2s. 10d. per 1000 c.ft., and for domestic purposes, 3s.; in the rural district of Saddleworth, 3s. per 1000 c.ft. for trade purposes, and 3s. 1d. for domestic.

LONG SERVICE WITH THE DAVIS GAS-STOVE COMPANY.

Mr. George Goatley Honoured.

The "G.O.M." is by no means a rare type in the gas industry, but it was a memorable occasion on Wednesday, Jan. 9, when Mr. Cyril Davis, a Managing-Director of the Davis Gas Stove Company, Ltd., entertained at dinner at the Euston Hotel Mr. George Goatley, on his 81st birthday. Mr. Goatley has been for upwards of forty years in the service of the Company, and is the oldest member of their staff. Mr. Cyril Davis was in the chair; and besides him and the guest of the evening there were present all the employees with over 25 years' service, averaging a length of service of 30 years each.

Everyone at the dinner was induced to make a speech, and there were many interesting and humorous reminiscences recounted of the early days of the gas-stove industry, when competition was very different from what it is to-day. The hearty and spontaneous character of the eulogies in these speeches testified to the genuineness of the affection and esteem in which Mr. Goatley is held, not only by his colleagues, but also by his Managing-Director. These sentiments were summed up in an illuminated address, which read:

> To George Goatley, Esq., on his 81st birthday, Jan. 9, 1924.
>
> A tribute to 40 years' faithful service, and a token of affection from the following, who for more than a quarter-of-a-century have worked with you and appreciate your courteous and kindly disposition. Diligent in business, genial in hours of leisure, you represent to us a type of the industry and personal qualities which have contributed so largely to the success of
>
> The Davis Gas Stove Company, Ltd.
>
> [Here follow the signatures.]

A number of telegrams and letters were received before the host and guests sat down to dinner. Mr. H. James Yates (Chairman of Radiation, Ltd.) wired his "heartiest congratulations, and the hope that he (Mr. Goatley) may long be spared," while the Chairman of the Davis Gas Stove Company (Mr. Addis Price) recalled that he and Mr. Goatley worked together when some of the present Directors of the Company were at school. From Mr. H. M. Thornton (Managing Director of the Richmond Gas Stove and Meter Company, Ltd.) came by telegram congratulations and best wishes. Mr. Harold N. Davis (Managing Director of the Davis Gas Stove Company) referred to Mr. Goatley's "still sprightly form," and wrote that it was "difficult to realize that he is our 'doyen' of 81 years of age;" while telegrams were received from Mr. Seaton Wood (Secretary of the Company), the London and Luton staffs, and also from Major F. C. Wheeler (Manager of the Nautilus Fire Company, Ltd.), who informed Mr. Goatley that "81 not out generally means a century."

TRADE NOTES.

The Standard Furnace Company.

We have received an excellent desk calendar from this firm, whose new address, it should be noted, is No. 17, Market Street, Southport. The calendar shows a month at a glance, and has an attachment by which the day of the month can be isolated, and so readily distinguished.

A New "Pusher."

Literature describing a new form of pusher for heavy charges has been issued by Messrs. Ride and Bell, Ltd., of Misterton, near Doncaster. Many advantages are claimed for this; and the firm express their willingness to supply full information to any engineer interested, and to arrange for demonstrations of the machine under working conditions.

Volker Gas-Mantles.

At the conversazione held at the Birmingham and Midland Institute from Jan. 15 to 18, the Volker Lighting Corporation (Branch of Lighting Trades, Ltd.), of No. 57, Garratt Lane, London, S.W., demonstrated several of the processes involved in the manufacture of Volker gas-mantles. The knitting of ramie yarn into stockinette, and the burning-off and shaping of soft mantles, created much interest among the visitors. There was also on view a complete range of samples of raw materials and chemicals used in the manufacture, together with specimens of each of the many types, of gas-mantles made by the Company.

Barimar Welding.

We have received particulars of an interesting repair carried out within the last week or so to two semi-Diesel cylinders. These cylinders were cracked half-way round the bores circumferentially and 15 in. longitudinally, and the owners were faced with two alternatives—an expensive replacement or an economic and speedy repair by scientific welding. The advantages of a welding repair were so overwhelming that they left the owners without a choice. Messrs. Barimar, Ltd., of Nos. 14-18, Lamb's Conduit Street, London, W.C. 1, were entrusted with the repair, conditional upon the work being done without distortion of any kind. The cracks were welded, the bores ground where welded, the pistons refitted, and all necessary machining and facing-up completed within a few days. Under test the parts proved to be absolutely sound and as strong as new. Barimar had again accomplished what was regarded as "impossible," and executed a repair which, only a few years ago, would have been outside the range of consideration.

The "Super-Mix."

From Messrs. Thompson & Co., of No. 48, Watling Street, E.C. 4, who are the sole selling agents for the "Super-Mix" mixing mill manufactured by the Low Engineering Company, Ltd., we have received particulars of the three types of this efficient mixing machine. Type "A" is designed for use wherever fine grinding in liquid or emulsification of fluids is required. Carbon, pigments, and lakes can be suspended in oil, water, or other media; and solids and liquids on which it is desired to act chemically can be brought to so fine a state of division in liquid suspensions that chemical action is greatly hastened and facilitated. The output of the mill varies with the viscosity of the fluid, the amount of energy absorbed in the disintegration, and the horse-power applied. With ordinary materials the amount of liquid treated varies from 30 to 100 gallons per hour, with a motor capable of developing 10 B.H.P. Pattern "B" has an output varying from a pint to a quart in five minutes; and the "C" type is designed for hand operation. All the mills have been designed after exhaustive tests undertaken by Prof. Maxwell Lefroy and Prof. A. M. Low.

THE NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

With the more threatening situation as regards the rail strike, the market opened this week very strongly, and a keen demand was maintained throughout. Any free coal was eagerly snapped up, though collieries mostly had their week's outputs previously stemmed, and no great amount of new business passed. For forward, however, buying was keen, and the prospects for February now appear to be assured. The demand both for export and for home consumption is very promising. Coking, which had previously been a much weaker market, improved to as much as 25s. 6d. for bests, and seconds were 24s. 6d. f.o.b. Northumberland steams and Durham bunkers were both firm. The demand for gas was naturally strong, London calling for increased quantities, and even buying a few cargoes from collieries outside their usual range of contracts. The price, however, did not advance substantially; 24s. 6d. to 25s. being the quotation, and the latter figure still being difficult to obtain even for best makes. Others were 23s. 3d. to 23s. 9d.

To-day (Monday), with the strike an actuality, but only in its earliest stages, it is as yet impossible to say what the position will be. Up to the time of writing, practically no coal is being led up from the collieries, and the loading places are working part only of the berths. Collieries are trying to spin-out what empties they have at the pits by putting coal on the ground; but the majority of those dependent on the railway company have practically no facilities for this. A good many others have private loading staiths, or their own connections with the river. These, of course, will not be affected. It remains to be seen to what extent the railway authorities can organize a service of mineral traffic to keep the collieries working. In reply to inquiries, at present they can give no information.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From a Local Correspondent.

There is marked activity in all sections of the Yorkshire and Lancashire coal trade, probably due to the menace of a railway strike, and possibly also to some interference with output later on from the miners. There is, in addition, a general uncertainty owing to the political situation, with the result that consumers are inclined to pay considerably more for immediate forward deliveries than would have operated some weeks ago. London in particular has increased both its orders and its prices, and figures in this direction for ordinary house coal have advanced from 1s. to 7s. per ton. There are no stocks at collieries; while merchants report a shortage. Industries are trying to accumulate stocks.

The gas coal market is most difficult at the moment, as consumers of this class of fuel report that they are not obtaining their full contract supply, while those who had not purchased are paying considerably more for immediate requirements.

The high rates of exchange abroad have prevented an increase in the export department; but prices are well maintained, with a slight indication of advances.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

Everybody connected with the trade is passing through a harassing time. Apart from all the menace to transport involved in a labour revolt on the railways, the distribution of coal has been delayed by snow and fog. The same causes have curtailed output and hampered the work of the surface men at the pits. While the supplies to the gas-works have not been seriously reduced, there has inevitably been trepidation in the minds of engineers, as inroads on reserves could not be avoided. The industrial demand has been met, but the margin separating some of the manufacturing establishments from absolute dearth is very slender. Anxiety is occasioned by the increasing precariousness of deliveries. The difficulty of filling-up deficiencies from the open market is now very great. Collieries are falling into deeper arrears with their orders, and the competition for household supplies has sent up prices by one to two shillings more; the Midlands having followed London in the rush for anything that will burn.

Slacks are difficult to get. The high prices they command are not conducive to an easing of the coke stringency, which remains acute. Blast-furnaces are not getting such a large proportion of the output from the ovens as they could rely upon formerly, for apart from the export demand, which in great measure is transitory, there has been a great widening of the radius of consumption of hard cokes in this country.

Owing to a short circuit, the electricity supply failed last Wednesday evening over a large area in the middle of Paris, which in consequence suffered inconvenience for more than an hour-and-a-half.

At the Wiggs works of the United Alkali Company, an explosion, followed by a fire, recently occurred in the carbon-bisulphide distillation plant. The fire was, however, speedily extinguished by the works brigade. The man who was in charge of the plant at the time of the accident sustained injuries.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Jan.* 21.

The market for tar products continues without change. In the absence of orders, pitch continues nominal. Should the rail strike continue for any lengthy period, there may be some reaction in view of the probable shortage of coal supplies. Creosote is a firm market at from 10d. to 10½d. per gallon. Crude carbolic acid 60's has shown a considerable fall recently, and is quoted at about 2s. 3d. per gallon. Tar spirits and other products remain without material alteration.

Tar Products in the Provinces.

Jan. 21.

Markets have remained quiet throughout the week. Pitch is still very dull, and business is reported in London and the East Coast at figures as low as 85s.; while some quantity has been reported to have been sold in South Wales at 90s. c.i.f. Creosote still remains firm, and the demand from the States continues. Refined tar orders are reported to be in excess of last year. Cresylic acid maintains its price with difficulty; while crystals carbolic still remains weak, which is having, of course, a corresponding effect on the demand for crude carbolic.

The average values for gas-works products during last week were: Gas-works coal tar, 59s. to 64s. Pitch, East Coast, 82s. 6d. to 85s. f.o.b. West Coast—Manchester, 80s. to 82s. 6d.; Liverpool, 81s. to 83s. 6d.; Clyde, 82s. to 84s. 6d. Benzole 90 p.ct., North, 1s. 0½d. to 1s. 1d.; crude 65 p.ct. at 120° C., 9½d. to 10d. naked at makers' works; 50-90 p.ct., naked, North, 1s. 5d. to 1s. 7d. Toluole, naked, North, 1s. 4d. to 1s. 5d., nominal. Coal tar crude naphtha in bulk, North, 7½d. to 8d. Solvent naphtha, naked, North, 11d. to 1s. 1d. Heavy naphtha, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, liquid, 8¼d. to 9d.; salty, 8¼d. to 8¾d.; Scotland, 8½d. to 8¾d. Heavy oils, in bulk, North, 9d. to 9½d. Carbolic acid, 60 p.ct., 2s. 1½d. to 2s. 4½d. prompt. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

Unemployment Grant for Oswaldtwistle.—Mr. J. Davies, Gas Engineer to the Oswaldtwistle Corporation, recently made an application for a financial grant towards the cost of laying gas-mains at an estimated outlay of £6300; and though the township is not officially recognized as an unemployed area, the Grants Committee have sanctioned the application. This means that the Ministry of Labour will pay 60 p.ct. of the wages cost, calculated to amount to £2200. The scheme has already been put in hand. To meet the cost out of revenue, the Committee will probably defer any prospective reduction in the price of gas.

Gas Enterprise at Swansea.

Housing schemes in the area of the Swansea Gas Light Company are very carefully watched, and builders are canvassed with a view to installing gas. Great attention is likewise paid to Corporation buildings and schemes; and in this direction the Company have lately scored a signal success. An old industrial school is being converted into flats which will provide for fourteen families accommodation in suites ranging from two to four rooms. There are a communal kitchen, drying-room, the usual conveniences, with shower-baths, a swimming-bath, and laundry. The ground-floor flats are centrally heated, and those who do not come within this portion are to be equipped with gas-fires. This decision the Housing Committee (with whom was the Chairman, Alderman Molyneux) took during a visit of inspection, when they were shown over the building by the Borough Architect (Mr. Ernest E. Morgan). Each flat has its own gas-meter. The lighting is also by gas.

Some Smokeless Fuel Difficulties.

In the course of a letter to the Editor of "Chemistry and Industry" on the practical difficulties in the way of the use of smokeless fuel, "Vulcanus" asks: "Can smokeless fuel, other than gas coke, be obtained at the same price, and with the same ease of delivery, as coal? If so, will some kind friend please direct our wandering footsteps in the right way? Then is such a fuel suitable for all domestic purposes, without installing special appliances? In this case I refer particularly to the heating of water. Few of us of the rank and file are paid large enough salaries to enable us to instal either geysers or coke-fed boilers for the probable benefit of our landlord, even where we have the room. Assuming a small flat with hot water obtained from the sitting-room fire of the 'Inter-Oven' type, or, on the other hand, an old-fashioned kitchen with hot water provided by the kitchen range, would smokeless fuel do the needful? Again, while many of us have to abide in small flats where the scanty cellars (*sic*) hold but a bare 10 cwt. of coal, could we be sure of obtaining supplies frequently enough, and without the extra expense which so few of us can afford until our services are better appreciated by our Directors? . . . Abolish the use of raw coal for steam-raising, for which purpose gas coke is quite suitable, and, given adequate supplies and facilities, the open coal fire will disappear also."

New Companies Registered.—Messrs. Jordan and Sons, Ltd., Company Registration Agents, of Chancery Lane, London, have compiled their usual annual statistical report relating to new companies registered in England during the year ended Dec. 31 last. The number of registrations recorded was 8005, or only 12 in excess of the 1922 figure of 7993. Among the different classes, electricity, gas, and water together account for 289 registrations, with a total capital of £1,116,830.

THE NEW "BEARSCOT" TWIN GUIDE ROLLERS

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34, VICTORIA STREET,
WESTMINSTER, S.W. 1.

MANCHESTER.

STOCK MARKET REPORT.

THE general depression which prevailed during the previous week was again the rule when the Stock Markets opened last week. This was attributed to the uncertain political situation, combined with the further decline in the value of sterling and francs. As the week progressed there was a slight steadying of prices, and the fluctuations in the exchanges were perhaps more responsible for any weakness than the state of affairs at Westminster.

The French franc moved against France to 98·25, which constitutes another record; but the raising of the French Bank Rate, and the announcement of the intention of the French Government to impose increased taxation, brought about a material improvement—the rate dropping to 90, and finally closing on Friday at 92·90.

The threatened strike by the members of the Associated Society of Locomotive Engineers and Firemen was another cause for anxiety. Considerable optimism, however, prevailed that an actual stoppage would be averted; but the latest news up to Saturday, in spite of the efforts of the Labour leaders, was not very hopeful. The Home Railway Market was, however, not materially affected by the threat, as prices had already sustained a considerable setback.

On various rumours with regard to the payment of interest, there was a rush of business in the Foreign Market to secure German and Prussian Bonds. Quotations doubled on Thursday; but after a further advance on Friday morning on profit-taking by speculators, prices slid back rapidly.

In the Industrial and Miscellaneous Markets a better tone prevailed all round, and there was a material recovery in Tobacco shares, particularly Imperial of Great Britain.

In the Gas Market, the proximity of the dividend payments possibly assisted in maintaining prices. The Commercial Company's stocks fell another two points, making four points in the fortnight, which is probably due to the proximity of the inquiry by the Board of Trade into the question of the standard price. There was considerable activity in the Primitiva stocks, doubtless due to the reconstruction scheme, without, however, any great fluctuation in prices. Other changes in the quotations were: Alliance and Dublin dropped 3 points, to 63-38; European ½, to 7-8; Gas Light 3⅛ p.ct. maximum 1 point, to 62-65; Imperial Continental 3, to 133-148; Montevideo advanced 7 points, to 57-62; and South Suburban fell ⅛, to 97-102.

The following transactions were recorded during the week: On Monday, Alliance and Dublin 64⅜, British 118, Cardiff 7½ p.ct. debenture 106⅜, 107½, Commercial 4 p.ct. 92, 92½, Gas Light and Coke 90½, 90⅜, 91, 91¼, Imperial Continental 136, 137½, Montevideo 57⅛, 58, 58⅛, Primitiva 5 p.ct. preference 25s., 26s., 27s. 6d., 28s., South Metropolitan 92½, 92⅜, 93, Swansea 7 p.ct. preference 102, 6½ p.ct. debenture 102. Supplementary prices, Croydon 7½ p.ct. preference 102, 103. On Tuesday, Alliance and Dublin 64⅜, Bombay 5½, 5 5/16, Brentford "A" 99, 100, Commercial 4 p.ct. 91⅛, 3½ p.ct. 91⅛, Gas Light and Coke 90, 90½, 90½, 90⅜, 90⅝, 91, Imperial Continental 136, Liverpool 7 p.ct. preference 106, Montevideo 59, 60, Primitiva 5 p.ct. preference 27s., 27s. 6d., 28s., South Metropolitan 92½, Swansea 6½ p.ct. debenture 103, Tottenham "B" 101⅛, Wandsworth "B" 110, Wimbledon 5 p.ct. 105. Supplementary prices, Bournemouth 6 p.ct. preference 11⅞, Newport (Mon.) 5 p.ct. 81, 81½, Uxbridge 5 p.ct. 91½. On Wednesday, Alliance and Dublin 66, Bahia Blanca "A" 3s. 6d., 4s, 4s. 3d., Bombay 5½, British 116¼, Commercial 4 p.ct. 92, 93, Gas Light and Coke 90, 90⅛, 90⅜, 90⅝, 91, 4 p.ct. preference 77½, Imperial Continental 135, Liverpool 7 p.ct. preference 106, Montevideo 58, 58½, Primitiva 6s. 3d, 6s. 6d., 5 p.ct. preference 26s. 3d., 26s. 6d., 27s., South Metropolitan 92, 92½, 92⅝, 6½ p.ct. debenture 104, Tottenham "B" 101⅝, 101 13/16. Supplementary prices, Southend 5 p.ct. "B" 88, 88½. On Thursday, Bahia Blanca "A" 3s., Commercial 3½ p.ct. 91, European 7⅛, 7¼, Gas Light and Coke 90, 90⅛, 90½, 90⅜, 4 p.ct. preference 77, Imperial Continental 133, 136, 137, Montevideo 57½, 58, Primitiva 6s. 3d., 6s. 6d., 5 p.ct. preference 26s., 26s. 3d., 26s. 6d., 26s. 9d., 27s., South Metropolitan 92, 92½, 92⅝, 3 p.ct. debenture 58½ *ex* div., Tottenham "B" 101 13/16. On Friday, Bombay 5 5/16, British 118, Cardiff 7½ p.ct. debenture 106, Continental Union 32, European 7⅛, Gas Light and Coke 90, 90½, Imperial Continental 134, Metropolitan (of Melbourne) 4½ p.ct. debentures 97, Montevideo 57½, Primitiva 6s., 5 p.ct. preference 26s. 3d., 26s. 4½d., 27s., 4 p.ct. debenture (1911) 55, Wandsworth "B" 110, 111.

Conditions were comfortable in Lombard Street at the close of the week. The usual charge for old day-to-day loans was 2½ p.ct., and fresh advances were obtainable at from 2 to 2½ p.ct. The rate at which Treasury Bills were tendered for was less favourable to the Government—averaging £3 7s. 3·72d. p.ct., as compared with £3 4s. 9·62d. last week.

The Foreign Exchanges finished as a whole considerably steadier. In sympathy with the French franc, the Belgian rate dropped away to 102·20; Italian lire were slightly stronger at 97⅜; and sterling on New York fell away during the week from $4·27 to $4·24¼.

Business in the Silver Market was on a restricted scale. The cash price, however, was 5/16d. higher, at 33½d. per oz., than on the corresponding day last week.

The Bank rate is 4 p.ct., to which it was raised from 3 p.ct. on July 5. Bankers' deposit rates are 2 p.ct. The deposit rates of the discount houses are 2 p.ct. at call and 2½ p.ct. at notice.

ANTE-WAR PRICES AND DIVIDENDS. LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus	Last Divid. at Rate of	NAME.	Closing Prices, July 30, 1914.	Variation. Quotations, Jan. 18.	Variation. Lowest and Highest Prices of Transactions.
£			p.c.	% p.a.				
131,978	Stk.	Aug. 9	—	5	Aldershot 5 p.c. max. C.	..	72—77	...
217,992	,,	,,	4	4	Do. 4 p.c. Pref.	..	70—75	...
1,551,868	,,	Oct. 4	2½	5½	Alliance & Dublin Ord.	59—64	63—68	64⅜—66
374,000	,,	Jan. 10	4	4	Do. 4 p.c. Deb.	76—79	60—65*	...
280,000	5	Oct. 18	7½	8	Bombay, Ltd.	5—5⅛	5—5 5/16	5⅛—5 5/16
100,000	10	Aug. 9	16	8½	Bournemouth Gas and Water { 5 p.c.	..	12½—13⅛	..
383,110	10	,,	7	7	Bournemouth Gas and Water { B 7 p.c.	15—15⅛	11⅜—12⅜	...
115,000	10	,,	6	6	Bournemouth Gas and Water { Pref. 6 p.c.	13⅛—14	11—12	...
162,025	—	Dec. 28	—	4	Bournemouth Gas and Water { 4 p.c. Deb.	..	75—80	...
992,045	Stk.	July 12	14	6 5/16	Brentford A Consolid.	261—266	98—103	99—100
734,920	,,	,,	11	6⅛	Do. B New	204—209	98—103	...
55,000	,,	,,	5	5	Do. 5 p.c. Pref.	109—111	90—95	...
221,400	,,	Dec. 13	4	4	Do. 4 p.c. Deb.	91—93	76—81	...
214,745	,,	Aug. 23	11	11⅛	Brighton & Hove Orig.	208—213	175—180	..
244,200	,,	,,	8	8⅛	Do. A Ord. Stk.	154—159	127—132	...
1,287,500	Stk.	July 26	5	5	Bristol 5 p.c. max.	..	93—95a	...
570,000	20	Oct. 4	12½	12	British A Ord.	44—45	115—120	116⅛—118
100,000	10	Dec. 28	—	7	Do. 7 p.c. Pref.	..	120—125	...
120,000	Stk.	,,	4	4	Do. 4 p.c. Deb. Stk.	88—90	73—78	...
100,000	10	,,	—	6	Cape Town & Dis., Ltd.	1⅛—2⅛	6⅛—7⅛	...
100,000	10	Oct. 31	—	4⅛	Do. 4⅛ p.c. Pref.	4—6	6—7	...
150,000	Stk.	Dec. 28	4⅛	4⅛	Do. 4⅛ p.c. Deb. Stk.	70—75	73—78	...
237,860	,,	,,	—	7⅛	Cardiff 7½ p.c. Deb.	..	105—110	106—107½
157,150	,,	Aug. 9	5	5	Chester 5 p.c. Ord.	108—110	85—90b	...
1,513,280	,,	July 26	5/9/4	6	Commercial 4 p.c. Stk.	106—108	90—91	91⅛—93
560,000	,,	,,	5⅛	6	Do. 3½ p.c. do.	103—105	90—95	91—91⅛
475,000	,,	Dec. 13	3	3	Do. 3 p.c. Deb. Stk.	69½—71½	58—61	...
800,000	,,	14 Jan. 15	4	—	Continental Union, Ltd.	76—79	32—37	32
200,000	,,	Dec. 13	7	7	Do. 7 p.c. Pref.	115—118	78—83	...
660,000		Aug. 9	—	6⅛	Croydon alding scale.	..	102—105	...
284,975		,,	—	5	Do. max. div.	..	85—88	...
492,270	Stk.	—	6	4⅛	Derby Con. Stk.	125—125	107—110c	...
55,000	,,	—	4	4	Do. Deb. Stk.	102—104	74—76c	...
209,000	,,	—	—	5	East Hull 5 p.c. max.	..	..	...
1,002,180	10	July 12	10	5	European, Ltd.	17⅛—18	7—8	7⅛—7⅛
16,546,120	Stk.	July 26	4/17/4	5½	Gas { 4 p.c. Ord.	98—102	90—93	90—91½
2,600,000	,,	,,	3⅛	3⅛	Gas { 3⅛ p.c. max.	76—79	62—65	...
4,062,235	,,	,,	4	4	Light and Coke { 4 p.c. Con. Pre.	96—99	77—80	77—77⅛
4,761,930	,,	Dec. 13	3	3	Light and Coke { 3 p.c. Con. Deb.	72⅛—74⅛	57—60	...
130,000	,,	Dec. 11	10	10	Light and Coke { 10 p.c. Bonds	—	..	...
42,000	—	—	—	7⅛	Light and Coke { 7⅛ p.c. Ilford Deb.	..	..	...
82,500	,,	Sept. 19	5	6⅛	Hastings & St. L. 5 p.c.	..	93—98	...
258,740	,,	,,	3⅛	3⅛	Do. 3⅛ p.c.	87—89	78—83	...
70,000	10	Oct. 18	11	10	Hongkong & China, Ltd.	16⅛—16⅞	16—17	...
86,600	Stk.	Aug. 23	9	9⅛	Hornsey 7 p.c.	..	144—149	...
1,976,000	,,	Nov. 15	9	5	Imperial Continental	150—160	133—138	133—137⅛
401,400	,,	Aug. 9	3⅛	3⅛	Do. 3⅛ p.c. Deb. Red.	84—86	74—77	...
235,242	,,	,,	6⅛	6⅛	Lea Bridge Ord. 5 p.c.	119—121	95—100	...
2,127,240	,,	Aug. 23	10	5⅛	Liverpool 5 p.c. Ord.	—	88—89b	...
600,000	,,	Sept. 19	—	7	,, 7 p.c. Pref.	..	104—107b	106
165,736	,,	Aug. 23	7/5/6	9	Maidstone 5 p.c.	—	125—130	...
63,480	,,	Dec. 28	—	—	Do. 3 p.c. Deb	—	54—59	...
75,000	5	Dec. 13	6	5	Malta & Mediterranean Met. of Melbourne { 4½ p.c. Deb.	99—101	95—98	97
50,000	100	Oct. 1	4½	4½	Montevideo, Ltd.	11⅛—12	57—62	57⅛—60
341,920	Stk.	Nov. 29	4	4	Newcastle & Gatsh'dCon.	98⅛—99⅛	85—86d	...
1,875,892	,,	July 26	4⅛	4⅛	Do. 4 p.c. Pref. Stk.	..	74⅛—76⅛d	...
250,166	,,	Aug. 9	—	4	Do. 3⅛ p.c. Deb.	82—83	72—73d	...
329,705	,,	Dec. 28	3⅛	3⅛	North Middlesex 10 p.c.	—	16⅛—17⅛	...
15,000	10	Aug. 23	—	11	,, ,, 7 p.c.	14—15	11⅛—12⅛	...
75,940	10	,,	7/14/0	7 7/10	Oriental, Ltd.	117—122	97—102	...
300,000	Stk.	Nov. 29	8	9	Plym'th & Stonh'se 5 p.c.	..	105—110	...
138,120	Stk.	Dec. 28	—	7⅛	Portsea Island, B	128—131	105—110	...
60,000	50	Sept. 6	13	13	Do. C	118—121	100—103	...
100,000	50	,,	12	12	Primitiva Ord.	5⅛—6	1/16—1/8	6/—6/6
1,450,345	5	29 Oct. 14	8	—	Do. 5 p.c. Pref.	4⅛—5	1⅛—1⅛	25/—28/-
2,499,800	5	30 Dec. 15	5	—	Do. 4 p.c. Deb.	91—93	70—75	...
341,400	100	Dec. 3	4	4	Do. ,, ,, 1911	—	55—58	55
600,000	Stk.	July 26	4	4	Do. B. Aires 4 p.c. Deb.	85—87	55—58	...
220,335	,,	Dec. 28	4	4	Do. Riv. Pl. 4 p.c. Deb.	85—87	55—58	...
321,670	,,	,,	4	4	San Paulo { 6 p.c. Pref.	10⅛—11	5⅛—6	...
150,000	10	Oct. 4	6	6	San Paulo { 5 p.c. Deb.	47—49	37—40	...
125,000	50	Jan. 2	5	5	Sheffield A	223—224	100—102s	...
270,000	Stk.	Aug. 23	10	5	Do. B	222—224	100—102s	...
419,968	,,	,,	10	5	Do. C	220—229	99—101e	...
1,047,000	,,	,,	10		Shrewsbury 5 p.c.	—	..	...
133,201	Stk.	—	4		South African	10⅛—11⅛	7—9	...
90,000	10	Oct. 18	9	6	South Met. Ord.	111—113	91—94	92—93
1,609,895	Stk.	July 26	5/9/4	5	Do. Red. Pref.	—	97—99*	...
350,000	,,	Jan. 10	—	5	Do. 5 p.c. Deb.	72½—74½	57—60*	...
1,895,445	,,	,,	3	3	Do. 6½ p.c. Deb.	..	104—106	104
734,000	,,	Sept. 6	—	6⅛	South Shields Con. Stk.	157—159	136—138d	...
91,500	,,	Aug. 23	8⅛	8⅛	S'th Suburb'n Ord. 5 p.c.	114—116	97—102	...
1,087,795	,,	,,	6	6	Do. 5 p.c. Deb. Stk.	116—118	95—100	...
368,837	,,	Dec. 28	5	5	S'th'mpt'n Ord. 5p.c. max	99—102	85—90	...
647,740	,,	Nov. 15	5	5	Do. 4 p.c. Deb. Stk.	..	74—79	...
121,275	,,	Dec. 28	4	4	Swansea 7 p.c. Pref. Stk.	..	102—104	102
250,000	,,	Aug. 23	—	7	Do. 6½ p.c. Deb. Stk.	..	102—104	102—103
200,000	,,	Dec. 28	—	6½	Tottenham { A 5 p.c.	135—138	122—127	..
120,000	,,	July 26	—	8	Tottenham { B 3½ p.c.	115—117	100—105	101⅛—101 13/16
782,275	,,	,,	6	6⅛	District { 4 p.c. Deb.	87—89	77—81	...
181,255	,,	Dec. 13	4	4	Tynemouth 5 p.c. max.	108½—109	89—91d	...
258,252	Stk.	Aug. 23	5	5	Wandsworth, Wimbledon, and Epsom—			
30,000	,,	July 12	8⅛	9	Wandsworth A 5 p.c.	151—156	132—137	...
355,636	,,	,,	6⅞	7⅛	Do. B 3½ p.c.	129—134	110—115	110—111
108,075	,,	,,	5/17/3	6 5/16	Do. C.	110—115	98—103	...
140,865	,,	,,	—	6 5/16	New Ordinary	..	..	...
352,000	,,	,,	6⅛	7⅛	Wimbledon 5 p.c.	117—122	105—110	105
98,000	,,	,,	6⅛	7⅛	Epsom 5 p.c.	121—126	110—115	...
88,426	,,	Dec. 28	3	3	3 p.c. Deb. Stk.	66—69	56—61	...

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *s.*—Sheffield. * Ex div.

Belfast's Record Gas Output.—At a meeting of the Belfast Corporation Gas Committee, Mr. J. D. Smith (the Gas Engineer) reported that the output of gas on Jan. 8 constituted a record in the history of the undertaking, realizing a total of 14,399,000 c.ft. The output for the nine months to Dec. 31 was 2,477,256,000 c.ft., as against 2,321,115,000 c.ft. for the corresponding period of 1922.

New Retort-House for Driffield.—The Driffield Urban Council have decided to make application to the Unemployment Grants Committee for a grant towards the cost of a new retort-house, which is expected to cost £7500. Suggestions were made by two members of the Council that there ought to be an alternative scheme for electricity equipment, but as they did not bring forward any such scheme the matter was dropped.

Gas Supply for Shaldon.—The Teignmouth Urban Council have conditionally accepted the offer of Messrs. Codner's Trustees for a site on the beech at Ringmore for the erection of a governor-house for the supply of gas to Shaldon. They have decided to ask the Trustees to enter into a contract for the sale to the Council of the portion of the beach required for the sum of £50—such contract to be dependent upon the sanction of the Ministry of Health to a loan for a gas supply to Shaldon.

Proposed Gas-Works Purchase at Helston.—Reports on the proposed acquisition of Helston Gas Company's property have been presented by a Committee to the Town Council. These stated that the Committee would ascertain through the Company details as to how the sum at which they offered to sell was arrived at. The Committee had endeavoured to get in touch with a suitable person to make a valuation of the works, and hoped soon to have a name to submit to the Council, if it was decided to go forward with the proposal. The reports were adopted.

Gas Lecture at Morecambe.—At Morecambe, last week, Mr. T. W. Barratt (the Gas Engineer and Manager) delivered a public lecture on "Gas," at the invitation of the Morecambe Chamber of Trade. Mr. Barratt dealt with the part played by the gas industry during the war, the advent of the therm, and gas as applied to the needs of the private trader. He welcomed the opportunity of passing on a little information as to the new method of charging for gas. An interchange of ideas, he said, did a great deal to promote useful co-operation between the gas department and the public, and also helped to dispel any remaining trace of the old time belief that the gas undertaking was an autocratic monopolist.

Burnley New Gas-Works Scheme.—The Chairman (Alderman Emmott) reported to the Burnley Gas Committee that it was advisable that the Gas Engineer (Mr. J. P. Leather) should, before presenting his report on the scheme for the construction of the new gas-works at Old Hall, inspect certain coke cooling and handling plant at Rotterdam. Mr. Leather was authorized to do so.

Aldershot Gas and Water Company.—The annual meeting of the Aldershot Gas, Water, and District Lighting Company has been fixed for Jan. 31. An interesting feature is the departure from the usual practice of holding the meeting at Aldershot. On this occasion it is intended to have it in the Boardroom of the new offices and showroom at South Farnborough. This fact is, in itself, an indication of the extended and extending ramifications of the Company, whose operations are spread over a very wide area. That the accounts for 1923 can be closed, and the meeting held, so promptly (with dividends payable on Feb. 1) is highly creditable to the department of the Secretary (Mr. F. A. Ricketts), particularly when it is remembered that the undertaking is a three-sided one—including gas, water, and electricity.

By permission of Mr. E. E. Finch, M.Inst.C.E., City Engineer, and arranged by Mr. W. J. Liberty, a party of fifty students from the Final Gas Supply Class held at the Westminster Technical Institute, accompanied by the lecturer (Mr. E. L. Oughton) and his Assistant (Mr. Dietrichs), paid a visit last Saturday afternoon to the City Subways, Holborn. Mr. Liberty had arranged to conduct the party, but having met with a slight accident during the week was unable to be present—a fact which was greatly regretted. His assistant, Mr. A. J. Kenward, took charge of the students in place of Mr. Liberty, and gave instructive information regarding this part of "Underground London." By diagrams, drawings, and actual demonstrations the party were shown the methods and practice of main and pipe laying, jointing, and house connections, the ease and economy of carrying out the work, and the enormous sums saved in excavation and paving charges by the companies having mains and services in the subways. The party perambulated about 1½ miles of underground streets—all paved, clean, ventilated, and artificially lighted by gas, and inspected the large trunk high-pressure gas-main that runs from Beckton to the West End. A hearty vote of thanks was passed to the Corporation on the proposition of Mr. Oughton. It was agreed that the visit had been most interesting, and many questions were asked by the students.

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